INTERNATIONAL

MARINE ENGINEERING

Published Monthly by ALDRICH PUBLISHING CO.

461 EIGHTH AVENUE, NEW YORK — 8 BOUVERIE ST., LONDON, E. C.

H. L. Aldrich, President and Treasurer — Assoc. Member of Council, Soc. N. A. and M. E.
George Slate, Vice-President
E. L. Sumner, Secretary
E. J. P. Benn, Director and Publisher — Associate Inst. N. A.

Edited by H. H. Brown, A. M. Inst. N. A.
Member Soc. N. A. and M. E.

Vol. XXII — OCTOBER, 1917 — No. 9

More Liberty Bonds

THE campaign for the second liberty loan, which opens on October 1, will close on October 27. Practically everyone who participated in the first liberty loan should find it an easy matter to make a second subscription, as arrangements will be made so that payment for the bonds can be made from future savings. War savings certificates will be sold in as small denominations as $5 (£1).

Shipyard Strikes

THE differences between employers and employees in many of the shipyards, which have led to numerous strikes and consequent delays in shipbuilding, must give way to a working agreement on a basis which will be fair to both sides of the controversy. Although the causes of the labor disputes differ in many cases, nevertheless the commission which has been appointed by the President to visit the localities where disagreements have been most frequent should speedily clear up any misunderstandings which hitherto have prevented settlements.

War Committee of Technical Societies

A COMMITTEE has been organized by the Engineering Council, to be known as War Committee of Technical Societies. The function of this committee will be to act as the intermediary or means of communication when desired in matters relating to science, research, invention and engineering between the army and navy, the various boards, councils, committees and other agencies of the government and the membership of the societies represented for the purpose of presenting problems in science, research, invention and engineering to the members of the technical societies and of obtaining their ideas and suggestions.

It is hoped that in this way the large number of members of the technical societies who are not already actively at work on war problems can be reached, and their inventive, technical and engineering abilities mobilized. The societies represented on the War Committee include the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Mining Engineers, the Mining and Metalurgical Society of America, the American Electro-Chemical Society and the American Institute of Electrical Engineers.

Use the Inland Waterways

IN an address delivered before the Business Men's War Convention at Atlantic City, Walter Parker, assistant to Secretary Redfield, of the Department of Commerce, made a strong appeal for a greater use of inland waterways to meet the transportation problems now facing the country. He pointed out that the inland navigable waterways of the United States must be used as an adjunct to the railroads and in co-ordination with the railroads. To meet the urgent needs, a system of transportation must be developed under which transportation lines of least natural resistance and cost of operation in relation to the service required will function without friction and without unnecessary restraint. Otherwise, railroad and terminal congestion, which has long been serious, will become more acute. The day of railroad monopoly of transportation is now forced to an end, just as the day of boat monopoly was forced to an end years ago.

The National Council of Defense has named a committee on inland waterways and has placed the Chief of the Army Engineers at its head. The committee is vigorously promoting the use of the waterways as a means of relieving the war strain on the railroads. On August 3 Congress finally adopted what is known as the river regulation amendment to the Rivers and Harbors Bill, providing for the creation of a cohesive, constructive and continuing national policy of developing and using the now wasted navigable waterways. Inaugurated by necessity, this development cannot fail to become a permanent factor in economic transportation in the United States.

Standardized Shipbuilding in Great Britain

GREAT BRITAIN'S first standard ship, a cargo steamer of 8,000 tons deadweight carrying capacity, was built in a little less than six months. Later vessels of the same type, it is predicted, will be built in from four to four and a half months. Two types of standard ships, both of the same size, are now being constructed, one a single deck ship and the other a two-deck ship. Smaller vessels of 5,000 and 3,000 tons deadweight carrying capacity, respectively, are also being standardized.

According to reports, the official trials of the first standard ship were successful in every respect. Although particulars regarding the vessel have not been disclosed it is said that the design provides for a minimum amount of steel consistent with the requirements of Lloyd's, the British Corporation and the Bureau Veritas. The vessel is specially arranged to facilitate the rapid loading and discharge of cargoes, and the quarters for the crew represent a marked advance over the usual accommodations in ordinary tramp steamers.

With characteristic thoroughness, British shipbuilders are not limiting their efforts in standardization to an emergency design but a committee has been formed, known as the British Marine Engineering Design and Construction Committee, which will frame rules acceptable to the Board of Trade and to the classification so-

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

cieties in connection with the design and construction of marine engines, boilers, condensers, auxiliary apparatus, propellers and shafting. On this committee are representatives of the principal marine engineering societies in Great Britain, as well as representatives from the Board of Trade and classification societies. It is believed that any standards developed by such a body, with proper provision for periodical revision, will not fail to bring the British marine engineering industry up to a high point of efficiency both as to quantity and quality of output.

Coastwise Shipping Bill

THE bill now before Congress giving the United States Shipping Board power to suspend the navigation laws relating to the coastwise shipping during the present war and for a period of 120 days thereafter, if enacted, will permit vessels of foreign registry to engage in coastwise trade of the United States under certain limitations and conditions. Such vessels can enter this trade only when granted permits by the Shipping Board limiting and defining the scope of the trade and the time of such employment. The Shipping Board is directed to give preference to vessels of foreign registry owned, leased or chartered by citizens or corporations of the United States.

This legislation is put forward purely as a war measure and is designed for the express purpose of securing the most efficient use of available tonnage. In the near future, practically one-third of our coastwise tonnage will be withdrawn for war purposes, and under present conditions this tonnage cannot be replaced, except by transfer from the Great Lakes, as practically all of the coast yards are engaged in the production of ships for foreign trade or for naval purposes.

Columbia University Offers Course on Ports and Terminal Facilities

COLUMBIA UNIVERSITY, New York, is probably the first higher educational institution to offer an entire course of lectures on the problem of the planning and equipment of the seaport as a vital factor in our national economy. Dr. R. S. MacElwee, of the Department of Economics, who gives the course, has had practical experience and an exceptional opportunity of studying European ports and their mechanical equipment, as he was connected for some time with the foreign business of a large American firm making elevators and conveyors. The lectures will be given at the downtown rooms of the School of Business, 203 Broadway, Mondays from 5.10 to 6.50 P. M. during the winter semester 1917, October to February.

The problem will be approached from the economic standpoint. The engineering features as such are only the important means to an end. It is estimated that the average cost to haul a ton of freight 240 miles is 74 cents (3/1). It costs 75 cents (3/1½) to handle it at the terminals. The increase in efficiency in both marine and railroad transportation has reached a point beyond which the further reduction of costs per ton mile must of necessity be small. The solution of further reductions in the cost of transportation must be found in the terminals. The link between ship and shore has been neglected and offers the greatest possibilities for scientific investigation and improvement. Port development has lagged in America and the congestion during the war has shown us all that we must mend our ways in order not to put undue burdens of cost on our foreign commerce in the sharp competition for the world's markets after the war. The merchants of the country begin to realize that the keenest engineers are needed to help them solve the problems of reduced costs to meet this competition.

Economic Importance of Seaports

As the ports of the country are of a vital national importance, transcending any local interests, it is necessary to make a careful analysis of what a seaport should be as a unit in the nation's economy. A port is a complicated affair and the tendency has been either to generalize without due regard for technical difficulties, or to become so completely engulfed in the fascinating engineering problems as to overlook some of the important economic features. Then there has been the tendency either to ignore the methods and experience of other peoples, or European methods have been held up as the only solution, to be Chinese-copied. Innovations have been attempted under conditions where they were sure to fail and then the failure used to discourage any attempt where the conditions were such as to make success more probable. We must work out our own salvation for ourselves in each case after exhaustive study of all available experience and peculiar local conditions.

Object of the Course

The object of the course is firmly to lay down the principles underlying the work which a port must perform as a co-ordinated and assembled piece of machinery. Then to take up in detail each of the various parts and its relation to the whole. In each case as many practical examples as can be collected for the purpose will be introduced to illustrate the point under discussion.

The readers of this paper can be of incalculable service by sending in to the lecturer any items, such as cost calculations of actual cases in operation and the saving over previous methods by improved installations. Also layout drawings and photographs are a great help, as the course will be illustrated as far as possible with lantern slides and exhibits. The variety of the material needed will become clear from the following outline of the subject matter of the course.

What the Course Covers

A general introduction will show the types of seaports, as to location and layout, with some historical reasons for the same and the dependence of a port upon its hinterland. The hinterland of a port extends to the point where the combined costs of moving freight through the port are equal to the costs of sending the same shipment through some competing port, or to the point where the traffic will not bear the costs. Thus a port is in a position to widen its hinterland by reducing costs of shipping through that port.

The study of the details will then begin at the point of contact between ship and land. Miscellaneous package freight only will be considered at first. How can a ship be unloaded, coaled, provisioned, loaded and dispatched in the most economical and expeditious manner? After the goods are on the wharf, how are they cared for? Where do they go and how are they to be moved there? If they are moved by rail into the interior, how is physical connection accomplished?

Freight Differentials

Here the interpellation of a considerable discussion of freight differentials in connection with port development becomes necessary. Also such details as marginal railroads, classification yards, handling c. l. and l. c. l. lots.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Packages may not move into the interior, but are destined for local consumption. This involves trucking. Then there is the warehouse for longer storage. How and where should they be constructed and how is freight moved to them?

Warehousing and Lighterage

In addition to the general merchandise warehouse there is the rising problem of cold storage and terminal markets for food products and perishable goods. This all involves inner harbor movement by lighter. The lighter is capable of infinite development in design and economy in connection with a better general layout of the port with all its parts.

Closely akin to warehouses are manufacturing plants which involve the entire question of the industrial harbor and the question of upland vs. waterfront property.

There is to be considered the movement into the interior by water. The Elbe has made Hamburg, the Rhine, Rotterdam, and originally the Erie Canal made New York. This involves barge terminals, mooring dolphins "in midstream" and various other accommodations.

River Port Industrial Harbors

The development of a water connection between port and hinterland involves the river port and also the river-port-industrial-harbor. The possibilities of this last development are so great as to stagger the imagination, especially as to what can be done to reduce manufacturing costs.

The river traffic brings into the port problem the handling of bulk freight from ocean to river vessels, in which Rotterdam has accomplished so much, as have also our own Great Lake ports. Even so, most of our bulk freight moves by rail. How is that managed? The ideal port must therefore have arrangements for handling and storing bulk and specialized freight, coal, ore, grain, coffee, cotton, bananas, oil, etc., and moving it by rail, barge, lighter or truck. This involves a correlation of special piers or basins to the whole and the need of a wealth of ingenious mechanical equipment which will continue to keep our engineers busy.

There is the important question of handling four classes of passengers with their luggage, and in addition express freight, such as gold shipments and United States mail.

A waterfront may also be a place of beauty as well as utility.

Administration and Jurisdiction

The nature of a port having thus been outlined and investigated in some of its details, there is the general question of administration and jurisdiction, with particular reference to the historical development of several successful port authorities. Then the fiscal aspects, including fees and dues, will be considered in relation to port administration, and the flow of traffic through the port in competition with other ports. The free port as an institution will require study in view of the present agitation concerning it, and in order to judge of its desirability or possibility on American soil.

Conclusion

A brief review of American and foreign ports will close the series. Each port will be criticised in the light of what has been discussed. This part of the lectures will have a direct commercial bearing on the routing of exports, necessary packing, etc.

The course is an ambitious one. The thirty periods of fifty minutes each will be none too long, but in that time much may be shown which will lead to a wider interest and understanding of the present and coming problem. The scientific improvement of our American ports concerns not only our engineers, economists and merchants, but also the entire American people.

LETTERS TO THE EDITOR

The Marine Oil Engine

An article in the July issue by Mr. John F. Wentworth on the marine oil engine interested me very much, as I fully agree with him about certain engines being pronounced a success while in reality they should be called absolute failures.

It seems strange that the entire engineering world has set their mind upon engines of the Diesel principle, with its numerous complications and disadvantages, while about the only thing that can be said in favor of the Diesel engine, as well as those of the surface ignition type (hot bulb engines), is the elimination of such a simple device as electric engine ignition. Electric ignition caused quite a good deal of trouble in internal combustion engines a few years ago, but since the perfection of the magneto, as well as the great improvements made in storage batteries, we find but few complaints from this source, and such troubles as we do hear about at the present day can all be traced back to gross negligence. Such people as cause these complaints can certainly not be entrusted with an engine of the Diesel, or so-called semi-Diesel, type.

I believe that the numerous automobile and marine gasoline (petrol) engines in use at the present time, and the majority of them in very unskilled hands, will bear me out with this statement.

The Diesel engine at its best is not a very flexible machine. If we compare it with a steam engine, the speed of which can be varied through such a wide range, we have, outside of its economy, absolutely nothing to say in its favor. The same is true with the surface ignition engine. There are several types of boats where flexibility of the engine speed is of prime importance. The most pronounced case of all is a tugboat, especially when wharfing a tow in a crowded harbor.

I have seen statements made by builders of Diesel engines to the effect that their engines can be started from stone cold to full speed in a few seconds. But how about from stone cold to slow speed? Will ignition take place? Any man who has had experience with Diesel engines knows the answer unless his idea of slow speed is that of a speed maniac.

In order to make an engine practical for direct connection to the propeller shaft of a vessel which is liable to operate in crowded waters, it should be capable of starting from a dead stop to no more than 15 percent of its rated speed, and kept running at such a speed for several hours. This may not be necessary very often, but when it is necessary it must be done or the engine is not suitable for the purpose. That such an engine is a possibility, I have sufficiently demonstrated with an engine perfected several years ago, which is the outcome of about twenty years of labor and experimenting. The pressure employed is no greater than in an ordinary gasoline (petrol) engine. It requires no special starting device, but is absolutely self-starting with the load on at a slow speed under all conditions even without the presence of an air storage tank. It uses the common heavy fuel oils at the same efficiency as any Diesel engine.

Jersey City, N. J. H. E. A. Raabe, M. E.

Generated on 2024-08-12 19:11 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Co-Operative Management

Shipyard Strikes Point to Necessity for Better Understanding Between Employer and Employee

BY ARTHUR F. JOHNSON

THE chief obstacle to steady and efficient advance of manufacturing industry has been lack of understanding between employer and employee, and that this situation still exists may be testified to by the numerous outbreaks of recent occurrence, particularly in our shipyards.

Such friction at a time when every deterrent should be removed from the path leading to maximum output, speaks ill for our managerial systems as a whole and every effort should be directed toward alleviating conditions. Nor should such remedy be one arriving at temporary compromise through appeals to patriotic motives unless all grounds for certain reaction with return of peace are eliminated. It is manifestly unfair to require either participant in the controversy to abide inequitable circumstances while the other enjoys proportionate gain.

It is obvious that no permanent condition of harmony will be attained until the present method of adjusting differences has been considerably modified, the mutual distrust abolished and both the administrative official and the man in overalls have been educated to an appreciation of each other's viewpoints.

There can be no "scientific management" until it embraces all the factors introduced into production by the human element, and since all mechanical processes, however perfected, are dependent upon human control, an exhaustive study of the man is finally the criterion of successful achievement.

From the standpoint of the executive, more must be accomplished than the mere hire of minor heads who "know how to handle men," and the workmen must regard their firm through clearer vision than that limited to the pay envelope or the clock.

When each laborer in the plant becomes more important in the firm's estimation than the most modern and powerful machine in the works, and when the employee will stand by his firm regardless of strikes elsewhere, feeling that the firm has given him all that he can justly demand, labor disturbances will be fewer.

Cause of Labor Trouble

There are three general causes of labor trouble. First, dissatisfaction with working conditions on the part of employees; second, demand for increased compensation by them, and third, sympathetic protest against real or fancied wrongs borne by workers in other firms or in allied trades in the same establishment.

No firm ordinarily takes the initiative precipitating breach of relations for the good and sufficient reason that it has the prerogative of "hire and fire." The men, being organized and having no other weapon beside the strike or walkout; use their one defensive means as a constant implied threat to further their cause.

Analyzing the three causes of discord with a view to remedy, the ordinary working conditions leading to trouble are employment of non-organized labor, increase in or more usually desire for decrease in hours of labor, speeding up of production or attempt to institute standards for rates of doing work, unjust conduct of minor or major officials, attempted foisting of improperly skilled hands upon firms or protest against their discharge, and most frequently a misunderstanding of institution or abolition of customs.

That the men are justified in organizing is acknowledged by all fair-minded employers, but that they have the power of dictation as to personnel employed is questionable. The fact that a worker satisfactorily performs his allotted task is all demanded of him on hire, the question of union being a personal matter between the worker and his associates, who should be sufficiently fair not to foist distastes upon an irresponsible third party. An employer can constitutionally no more demand that a skilled workman join a union than that he be of a given political belief, such conduct inevitably resulting in loss of prestige. It may be and is implied that firms are "strictly union" or "open shop," but should circumstances arise demanding choice between modified aspect toward labor organization and failure, the policy would most assuredly undergo change and that without serious detriment to output if properly administered.

Protracted consideration of this question is uncalled for, there having been frequent and exhaustive discussions thereon, to no evident purpose. Suffice it to state that in a plant brooking no outside interference and treating its men with fairness and firmness of policy, success can and has been attained in the treatment of this subject.

Eight-Hour Working Day

The question of appropriate length of working day has very probably been decided by the lead of requirements imposed in case of Government contracts, where the eight-hour day was stipulated. This resulted in almost universal adoption of eight hours as the period beyond which labor would prove inefficient, due to loss of energy on the workers' part and longer than which it was inadvisable to permit labor except in emergency. It is possible that the workmen may desire shorter days, but with scant hope of attaining the desired result. Such further reduction would be unjust to the work and entirely uncalled for unless in extremely arduous vocations where the matter has adjusted itself through special skill requisite, consequent scarcity of qualified men and desire to retain those of proper caliber.

A revision of the time per day upward is very improbable, but that all firms should adhere to eight hours is fair and a matter of economy. Any firm principled to the contrary will have difficulty in the future and is, without doubt, now having it. Though there may be endless applicants to replace the wornout personal material in an overworked shop it is a matter of national expediency that the stamina of the working classes be maintained.

Speeding up of production is the proper desire of well-organized industry and protest against its wrongs is to a great extent without just cause, even though the introduction of many really fair and economical systems has been balked. It is on this topic that the greatest amount of missionary work is capable of accomplishment with the possible exception of the curious misunderstandings constantly cropping up between the two factions.

Each industrial establishment has multitudinous small

Generated on 2024-08-12 19:52 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

leaks which are constantly being studied with a view to their elimination and of which new ones spring up with each innovation in procedure or complication as result of normal progress. The persistent limitation to advance in shop practice is the worker or his organization. Absolutely mechanical phases of the processes are ordinarily perfected to maximum degree, it being the co-ordination of man and machine in which the carefully planned system proves practicable.

Tradesman's Point of View

The average tradesman views with suspicion anything tending to alter his "tricks" and is also very jealous of the skill which placed them among his invaluable accomplishments. Occasionally there is reason for his pride, but more often a thorough familiarity with good manufacturing practice and innovations would point out the impropriety of or at least opportunity for improvement in most of them.

Until these prejudices and attitudes of self-sufficiency are corrected, little hope may be entertained of marked advances in efficiency. Once the evil has been erased the notable gain will elicit wonder as to the delay in instituting corrective measures, particularly in view of their simplicity.

The normal executive or technical member of a firm's personnel acquaints himself with improvements in the industry through literature, membership in organizations of specialists in his line, etc., applying the information so gained to the peculiarities of his establishment. The ability to bring this about is facilitated by his fundamental education.

The tradesman, on the other hand, is not so advantageously situated with respect either to information bearing printed matter, specialistic affiliation or degree of schooling. Trade journals exist, it is true, but whether of proper attitude and edition suitably to set forth the really important matters of the particular calling is doubtful. Granting that these improbabilities are so, their intimacy with the particular firm and its institutions are not in keeping with the personal tone requisite to insure careful perusal after a day's manual labor. Several firms have established their own editorial staffs and thus gone a step in the right direction.

A plant in which each workman understands the details of his duties has been taught to seek improvements, no matter how trivial, and appreciates the relation of his step in the process to those preceding and supplementing his, need anticipate no opposition to efficient and just innovations.

Personal Interest Essential

The innoculation of each employee with the "personal interest serum" would entail little cost other than the efforts and application of spare time by executives who at present waste many hours in worry over this very problem.

Primarily the interdependence of master and man must be realized and full advantage taken of good to be attained through conferences. With personal acquaintance, not impliedly demeaning, distrust will be minimized and confusion due to misunderstanding obviated. In many plants the department heads meet regularly to formulate programmes and then meet with the various shop foremen to perfect the details. This plan should be further elaborated by "shop conferences" between workmen and foremen, supplemented by regular meetings of entire departments, at which lectures could be given and open discussion indulged in.

It is to a firm's advantage to take active interest in the men's spare time and to assist them in spending it profitably. This can be brought about in one of two ways. The present labor organizations may be rendered more clublike, educational features and social events being fostered by the company, who might even assist in providing proper club and reading quarters. This feature would be on the nature of railroad Y. M. C. A. work, with the added essential of including the men's families wherever possible.

Regular classes could be established, affording study of the firm's methods and details of each operation in the process. Attending such classes would be compulsory for all apprentices, and even for newly employed mechanics, as well as office and technical men. Regular and seasoned workers would be given periodical instruction in improvements and contemplated innovations, while the suggestion box would be open to contribution by all concerned.

With regard to the heightened personal interest it would be to the firm's interest to afford opportunity for purchase of preferred stock or "baby bonds" by every employee, the payments being made on the installment savings plan.

Co-Operative Manager

The entire foregoing field should be under direction of a "co-operative" manager, affiliated with the staff of the industrial manager and responsible for all matters of personnel. Through him the foremen would hire their workmen and they would consult him frequently. The men should feel that they were encouraged to air their grievances with him and that all matters would be treated in confidence. This office would edit the yard paper, which would contain personal and lighter matter in addition to instructive articles of direct bearing on the work. Exchange items would keep the men informed as to matters in other firms of similar character, and there might even be an exchange employment bureau.

There have been instances in which incapable mechanics became attached to the rolls and possessed influence enough with their associates to draw forth protest against their discharge. This has at times resulted in local disturbances annoying and of a nature to render the labor organizations less favorably regarded by the executives than had they suppressed such unfair tactics.

To a great extent this has been eliminated, the men indexing or recording experience among themselves that a usurper might not aspire to employment justly due one of their number better fitted to perform the work.

The unjust conduct of minor officials has also been reduced to a minimum by the issuing of prescribed rules on the firm's part.

The frequent squibbles are, as previously stated, brought about by lack of understanding and can be reduced in ratio to the effort applied toward mutual study of the situations.

"Arbitration" is inevitable in settling labor disputes. Why not get together before the minor sources of dissatisfaction accrue to the point of forcing actual break? Why not look into the actual living expenses of an average family and equitably adjust wage rates to provide a slight margin for savings? Why not divert a small percentage of dividends to those who have wrought the producing medium, whether it be in stock manufacture or contract work? Why not teach the human members of the mechanism their true relation to the whole, capitalizing in this way the wonderful possibilities dormant in a mind forced into routine conception of its task?

The question has been and will continue to be an issue,

Generated on 2024-08-12 19:52 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

more and more prominent as the standards of living advance and the prices extorted make it difficult to keep abreast of them.

Why cannot the promoters of industry co-operate to study the vital problem of keeping the value of our specie at a standard instead of permitting it to constantly decrease in purchasing power?

The constant advance in prices in previous years must be checked and the appropriated champions of this effort should be those producing essentials of life and progress. Theirs is the knowledge that, regardless of price, a given concrete value attaches to their product and that it is not for manipulators to set the standard of worth, but the actual cost in drain on the supply of raw material and energy entering into the manufacture.

When the producers have realized this truth and acted to return our national to its approximate specie value, the question of compensation will have solved itself.

The entire discussion summarizes itself in the statement that "scientific management" as heretofore developed must be broadened to include precise study of the individual. That this research must result in a thoroughly American solution, subordinating any tendency toward the philanthropic and merely putting it before the man as a good, sound business proposition, making him realize that in working for a company he is working for his ultimate gain, the firm tiding him over the thin ice in his embryonic period of employment and encouraging him to put forth his best efforts with assurance of appreciation thereof.

Manning of Our Future Merchant Fleets*

American Ships Must Be Sailed by American Officers and American Crews to Make Our Merchant Marine Permanent

WITHIN a year, in all probability, the United States will possess a mercantile shipping tonnage more than double what we had at the outbreak of the war in Europe. We will have, more than that, a greatly increased capacity for building ships and an impetus in building them that will have got American capital and organization actively interested in planning a future expansion of the most efficient use of ships under our flag in the world-wide transportation of American commerce. The U-boat necessities, that have stimulated us to such instantaneous doing of what the necessities of our expansion and intensification of commercial effort called for before as a constructive national development, will probably have been met. There will then be more discussion of the things we must do to make a further, permanent development of our merchant marine. And one of the things to do will be to make the business of sailing American ships one that will attract and hold American officers and crews for the ships to come. For in American sailormen on American ships rests the American opportunity for doing in ocean navigation what we have done with our railroads.

The problem of manning the ships that will carry our troops and our supplies to France and our munitions and food to our Allies is already pretty well solved. There may be certain complications, but there exist the ready means for raising men for this phase of warfare. The real problem, as men who are in touch with what is being done with building the new mercantile navy now see it, is to provide for the time of peace after the war, when a very important element in the international contest for commerce is going to be the organization of systems of navigation along national lines. England and Germany are both preparing for this. Germany has recently announced a policy of subsidy to encourage rebuilding of merchant ships: owners who replace seized or sunken ships within three years may receive 60 to 80 percent of the then market cost of construction; the ships replaced between four and six years will receive a subsidy of 40 to 60 percent of the cost then; and reconstruction delayed till the seventh, eighth and ninth years will receive from 20 to 40 percent. The subsidy stimulates rapidity of shipbuilding, diminishing as it does in two ways, that is, in the percentage of total cost of a ship and in the presumed reduction in the general cost of construction, the subsidy being based upon the market value of the ships at the time of their completion.

Right at the moment, England is bending all the energies of her steel and shipbuilding capacity to the construction of the small, fast vessels designed to meet the U-boat campaign most effectively. But there is reason for believing that the British shipping interests hope for Government coöperation in a programme of large dimensions in which the cargo-seeking "tramps" of 10,000 tons deadweight capacity which shipping experience calls most economical for peace-time trade, and giant steamships (or motorships) running on regular lines and advantaged by having preference and privilege in a system of harbors strategically placed in all parts of the Empire, will serve the behests of British commerce.

In England it is predicted that our development of future shipping is to take the form of regular lines of great, fast steamers and of special fleets owned by single corporations and combinations of them which will be used as delivery systems, perhaps offering some public service also. We will not do much with the "tramp," in English opinion.

Form of American Shipping Development

The form our development of shipping takes will have an important bearing upon the problem connected with the manning of our ships. If the English who make the above predictions are right, and their prediction is based upon a shrewd and experienced judgment of the nature of ocean navigation, the American policy as to ships will fit exactly the American policy as to the merchandising of manufactured exports in foreign trade—we will not attempt the competitive sale of cheap goods, but will make

* From *The Americas*.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

our campaign upon the economies of quality, both in articles and in transportation. For ten years before the war we had been increasing our sales of manufactures in many far-away countries because our business interests were going after the markets in earnest, using our best salesmen, our best sales methods, and goods the manufacture of which had been so organized as to obtain quality of one kind or another through economies of efficient, highly paid labor and well-designed machinery as against mere cheapness of product. Analogously, we shall probably do very little with "tramp" cargo-seekers that roam the seas and pick up their crews wherever men can be found cheap. We should develop the economies of thoroughly organized "big" shipping, in which we can best use the best type of self-respecting American labor, making the conditions such as to attract this class of steady, sober men.

Training American Boys for the Sea

Will it pay to take American boys and give them training by thousands for the merchant marine as boys are trained for the navy? That may be a question for the practical economies of America's coming development of merchant shipping in big units to solve, or it may be taken up as a fact and organized in the national interest.

Twenty-five years ago only 40 percent of the crews of the United States Navy were Americans. We now have practically a 100 percent American navy. To-day, according to Andrew Furuseth, head of the International Seamen's Union of America, only 28 percent of sailors on American merchant ships are Americans. Anybody who has pictured what "American merchant marine" we had as American ships manned by American sailors, was mistaken. Our ships are overwhelmingly manned by floating foreign labor. On August first there were 5,000 enemy aliens employed on American ships, for the most part in the engine rooms.

The labor on most American seagoing ships is floating labor in the sense that it does not stay on any one ship. The majority of the sailors on American merchant ships sign only for the one voyage and are on a different ship a few days after returning to port. Thus we have a merchant marine manned by crews the majority of which have no particular fealty either to country or ship. They can hardly know their ship or their officers.

National Policy

There appear to be two policies that may be adopted by us, nationally, for the future manning of our merchant marine. One contemplates a continuation and extension of the present system of having crews of indiscriminate nationality on our growing merchant marine. This policy is now embodied in the present Seamen's Act. That act was written by the supposedly American sailors' unions and Mr. Furuseth in a recently published pamphlet speaks with great pride of the national policy created in it. The Seamen's Act gives an American sailor the right to quit his ship and compels the ship officers to pay him half the wages due him in any port, making illegal any contract he may sign before shipping that would otherwise hold him. It gives sailors on foreign ships the right to quit in any American port and demand half pay also (collecting the rest later), nullifying all treaties by which we and other nations heretofore prevented the desertion of sailors.

Mr. Furuseth claims this as a constructive American policy not merely to give "sailors rights," but to obtain foreign sailors for American ships and raise the standards of pay on foreign ships also. By deserting in an American port to get American wages, he says, the foreign sailors force foreign ships to pay higher wages. As far as the mere rate of wages goes, this has been the result, during the exceptional times since the Seamen's Act came into existence. Some American shipowners do not hesitate to agree with Mr. Furuseth so far. But they do not agree with him in regarding the thing as a wholesome American policy, either as a way of obtaining a supply of sailors or as a way of increasing the operating costs of the merchant navies of other countries to the level where we may evenly compete with them.

It would fasten upon the American merchant marine the mongrel crew and make more difficult the Americanization of American shipping. It is no great help to American shipping to have the individual wages of foreign sailors put up as high as the wages we pay, if fantastic requirements remain in the law by which an American ship must carry a lot of useless men while the foreign ships sail with smaller crews, and if the number of American boys permitted to sail on our ships is limited by having the relative proportions of "able seamen" and of apprentices and ordinary seamen fixed in the law to suit the unions. It is understood that the seamen's unions have consented to a tacit suspension during the war of some of these limitations, having threatened a virtual boycott of American shipping at this critical time if the Seamen's Act were modified in any way.

Americanize the Crews

However, there is much opinion among American shipping men in favor of something that will Americanize the crews as well as the hulls of our coming merchant fleet. A veteran officer of the navy, who is much interested now in the merchant marine, sees the development of American marine transportation efficiency coming which will require a better standard of personnel in the crews and be able to pay wages and make the career attractive. He calls attention to the great and growing fleet of one of America's greatest corporations, that has found having its own fleet is economical because it is more effective in its world-wide merchandising. The sailors on this fleet have a high proportion of Americans, the wages are above the standard, the accommodations for the crews are better than any law requires. It all pays. Presumably this corporation finds in more careful, efficient handling of its ships and its cargoes, and in having control of its own service, the economies that make it pay.

Subsidizing Man-Power of the Merchant Marine

The head of an important shipping consolidation in South America recently proposed to the Argentine Congress that the nation subsidize the man-power of its mercantile marine so as to encourage shipping and at the same time train men to operate its future war vessels. His plan was to create a large naval reserve of officers and men, the nation recruiting, training and paying them, and hiring them to shipping concerns on such terms as would make Argentine shipping pay. There is some such project advocated in this country, but the propaganda has not got much of a start yet. If the nation sees its advantages in having an American merchant navy, with self-respecting American boys taking to the ships as they do to railroad work or to mechanical pursuits, we might easily establish permanent training stations like Newport for young sailors, give them a "setting up" drill and all-round education in seamanship together, making the course such as to open to ambitious boys the opportunity to become officers. And we might go further with some national stipend which would be the equivalent of a bounty on seamanship. We could then have any standards of nautical service we might desire, taking the economic burden off the competitive operation of American ships.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Apparatus for Interpreting Stability for the Use of Shipmasters*

Stability of Vessels Under Ordinary Conditions of Loading Shown Graphically—Assumptions Made—Accuracy of Results

BY THOMAS GRAHAM, B. SC., R. C. N. C.

The object of this paper is to describe a simple apparatus whereby the stability of vessels under any ordinary conditions of loading can be shown graphically, and easily interpreted by shipmasters and others to whom the subject is of practical importance. The apparatus to be described has been designed to co-ordinate and employ fully the existing information supplied to vessels, namely, draft, deadweight, and displacement scales, metacentric diagram, and stability results.

To recapitulate procedure and to provide a working example, the calculation for the metacentric height of a vessel in the load condition is as follows:

Item	Weight in Tons	V.C.G. Above Keel in Feet	Moments in Foot-Tons
Ship in light condition.....	3,900	21.3	83,000
Coal	1,000	17.0	17,000
Cargo	3,500	20.8	73,000
Crew, stores, fresh water, etc..	50	25.0	1,250
Reserve feed water.....	100	2.0	200
Load condition of ship....	8,550	20.5	174,450

Height of transverse metacentre above keel = 22.3 feet
Height of C.G. above keel = 20.5 feet
"G.M." = 1.8 feet

In the above summary the cargo forms the heaviest item of the deadweight, and, as usual, is assumed to be homogeneous, the centers of gravity being reckoned coincident with the centers of volume of the spaces containing it. The result admittedly applies to only one type of cargo and stowage, and in the majority of cases this varies from voyage to voyage. The object, therefore, is to devise a system which shall so co-ordinate and adapt the information available to shipmasters as to render it applicable not only to one particular form of the above table, but to an infinite number of variations of it representing the conditions for all cargoes, homogeneous or otherwise.

To effect this by the method proposed, two assumptions are made:

(1) That each compartment into which cargo is placed is filled by that cargo to the underside of beams, in order that the center of volume of the hold or 'tween deck may always represent the center of gravity of the cargo.

(2) That the cargo placed in each space is homogeneous, though not necessarily homogeneous throughout the ship.

In the majority of vessels another approximation is justifiable. The heights of the centers of volume of the holds throughout the ship vary so little, that an average height may be assumed for them all.

In three typical cases the heights above keel of centers of volume of holds are as follows:

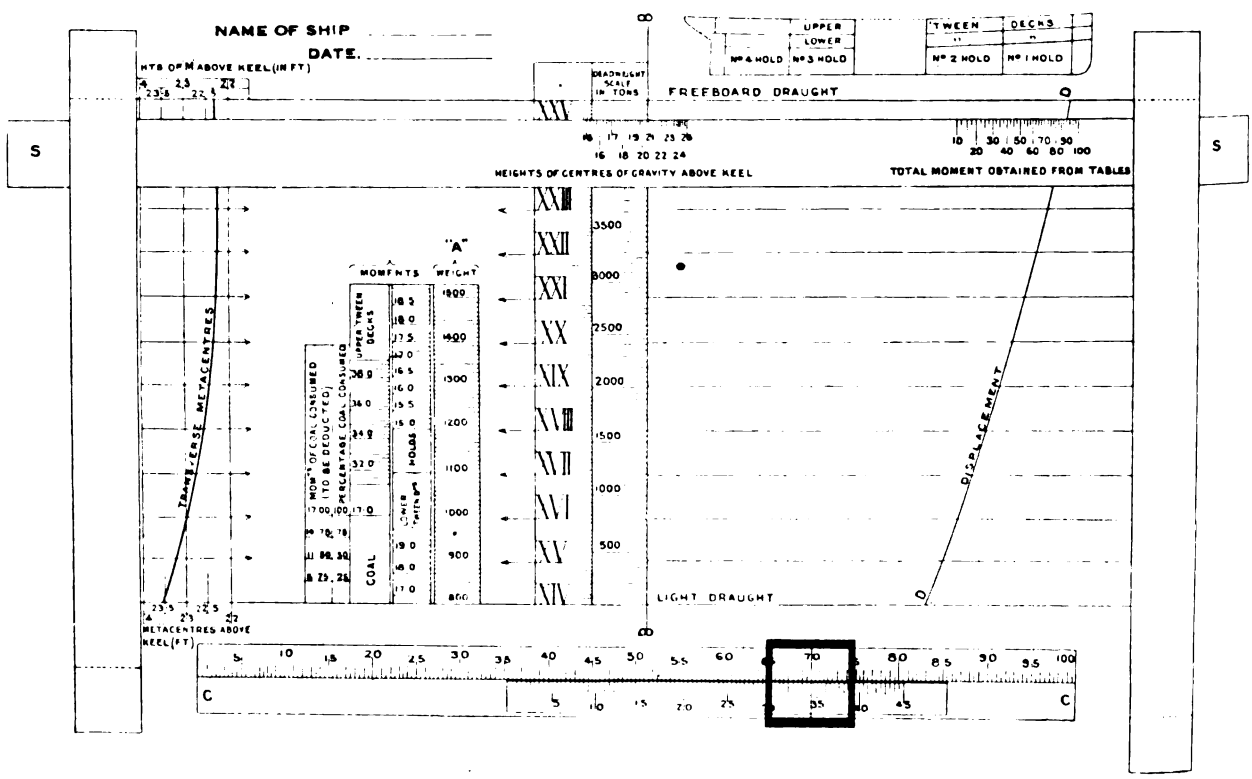


Fig. 1.—Chart Embodying Draft and Deadweight Scale and Curve of Transverse Metacenters

* Read at the Spring Meetings of the Fifty-eighth Session of the Institution of Naval Architects, London, March 28, 1917.

Generated on 2024-08-12 19:55 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

	1 Passenger and Cargo Vessel. Length 400 Feet	2 Cargo Vessel. Length 370 Feet	3 Cargo Vessel. Length 320 Feet
	Feet	Feet	Feet
No. 1 hold (for.)	14.1	17.5	17.4
No. 2 hold (for.)	13.4	15.8	16.0
No. 3 hold (aft)	13.2	15.5	15.6
No. 4 hold (aft)	13.7	16.7	16.5

No serious error, therefore, is involved in these and similar cases by taking an average height for all the holds. The 'tween decks can be similarly dealt with.

By doing this, work is greatly reduced, as with the conditions laid down in the second assumption, the total moment of cargo about the keel is directly proportional to the total weight of cargo, irrespective of the density of the cargo in separate holds or 'tween decks.

The chart shown on Fig. 1 embodies a draft and deadweight scale and a curve of transverse metacentres—information which is supplied for practically every vessel.

A is a scale of weights set up in any convenient units of length, ranging from the lowest to the highest probable amount of cargo which any compartment, or group of compartments similarly situated with respect to height, is likely to accommodate when full. In this case the lower limit is 800 tons and the higher 1,530 tons, the former figure being reckoned to underestimate the lowest weight of cargo which the smallest group of compartments (lower 'tween decks) will ever carry, and the latter figure exceeding what can reasonably be supposed to be the maximum contents of all the holds. Adjacent to Table *A* is a series of other columns designated "holds," "lower 'tween decks," "upper 'tween decks," and "coal." These contain scales of moments about the keel, of the cargo in the respective compartments corresponding to the concomitant weight values in Table *A*. Thus, if 1,450 tons were placed in the holds, the moment of that weight, namely, 18,200 foot-tons, is obtained in the corresponding "holds" column. Similarly, if 900 tons and 1,200 tons were put into the lower and upper 'tween decks respectively, the corresponding moments are 18,650 and 34,600 foot-tons. And so if all the items of deadweight be observed and summed in this way, the total moment of the deadweight about the keel for any distribution of cargo is known.

For work of this kind the values of the moments are represented with a reasonable degree of accuracy by the first three significant figures, and in consequence the values in the columns of moments have been expressed in thousands of foot-tons. This, too, eliminates figures of high magnitude from the chart, which is desirable.

C C, Fig. 1, consists of two similar scales, one of which is fixed and the other adjustable. A cursor is supplied for use in conjunction with these scales, in construction similar to that used on the ordinary slide-rule. The order of magnitude of the graduations on the scales being the same as that representing the moments in the columns (i. e., moments multiplied by 10^{-3}), the summation of the moments is rendered automatic. Thus, if as before 1,450 tons be placed in the holds, the moment is 18.2. Place the origin of the sliding scale at 18.2. Next 900 tons are put into lower 'tween decks giving a moment of 18.65. Move the cursor to 18.65 in the sliding scale and read off 36.85 on the fixed one and so on, the process of summation being continued until the full load is on board, which, to pursue the example taken, might be 4,500 tons with a moment of 90.0. Stores, fresh water, and reserve feed water having a small moment in the case cited, have been included in the light weight of the ship.

It may be noticed that the inclusion of water ballast, if carried in the double bottom, may be treated solely as an increase in deadweight.

The curve *D D* is displacement curve plotted logarithmically about the datum line *x x*, and *S S* is a scale graduated logarithmically to the same unit as the curve. This scale can be adjusted so as to facilitate the reading off of deadweight and moments at any draft, and also can slide in the direction of the ordinate of the displacement curve, so that the operation of division can be performed logarithmically.

Up to this point nothing has been said of the light ship and its moment about keel. The latter is allowed for in the scale *S S*. Thus, in the example taken, it was found that the total moment of the 4,500 tons of deadweight was 90.0, but the corresponding 90.0 on *S S* is arranged to represent 90.0 + 84.45. the total moment for the light condition. Hence, if this 90.0 on *S S* be placed coincident

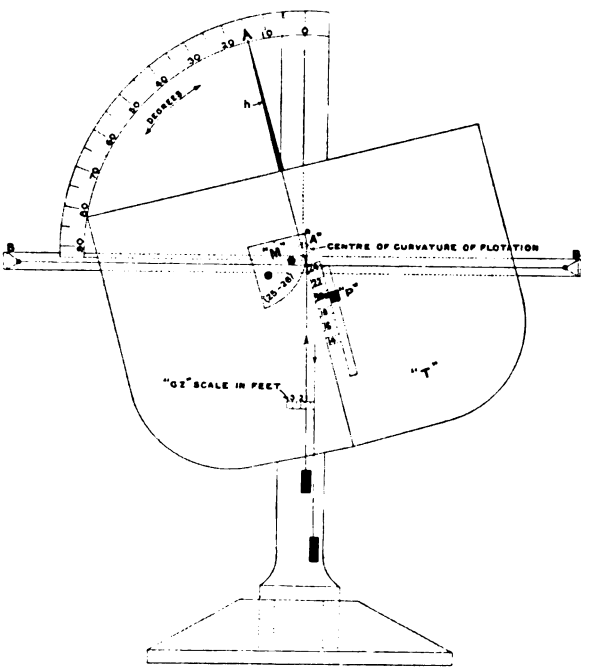


Fig. 2.—Diagrammatic Sketch of Indicator

with the displacement curve at the draft for 4,500 tons of deadweight—namely, 25 feet—the height of *G* above keel will be indicated on *S S* at the datum line *x x*, since log. moment—log. displacement gives the quotient in feet on a log. scale. Then from the adjacent locus of metacentres the *G M* can be obtained.

For the convenience of deducing the results at intermediate conditions such as those in which the coal is 25 percent, 50 percent, or 75 percent consumed, the "coals" table provides the weights and corresponding moments at these percentages, which will be deductions from the total weight and moment.

The whole operation is simple and accompanied by a degree of accuracy not much inferior to that which would be obtained by working out the results in the ordinary manner in a designing office. As a rule vessels are chartered for definite shipments, so a chart of this kind would be employed in the harbor of loading and the operator would have to concern himself only with observations of the draft and consultation of the deadweight scale.

For the purpose of interpreting the stability of ships at various angles of heel the indicator shown diagrammatically on Fig. 2 has been devised.

This instrument illustrates three features of stability which are of most practical importance, viz.:

(1) An automatic record of the variation of the right-

Generated on 2024-08-12 19:56 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

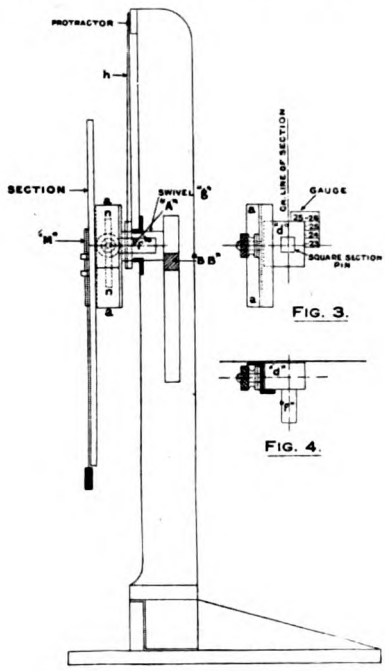
ing arm as the ship heels over from the upright to the vanishing angle.

(2) The approximate angle of heel at which the freeboard deck edge becomes awash.

(3) The position of the waterline throughout the range of moderate angles met with in practice.

T is a plane wood lamina representing the 'midship section of the vessel to any convenient scale, say ¼ inch to the foot, which can pivot about the point *A* in a vertical plane. On a protractor surmounting the section, degrees are marked off with respect to *A* as origin, so that as the section is displaced from the upright the angle of heel is indicated by the pointer *h*.

On the center line is a scale of feet graduated from the keel upwards, and a brass pointer *P* moving in a slot can be adjusted to any particular height on the scale. A plumb-line, consisting of a silk thread with small brass



Figs. 3-5.—Adjusting Device

weight attached, indicates the line of action of gravity of the ship at all angles of heel when hung over the pointer, the latter having been adjusted to the height of center of gravity above keel as determined by the use of the chart. *M* is a brass plate whose curved edge represents the metacentric evolute for the given draft and displacement.

On the section two screw spigots are fitted which pass through *H H*, holes drilled in the plate, and receive small nuts which fix the evolute rigidly to the section. Arranged to pass over the edge of this evolute is another plumb-line similar to the one described, and as it must always hang tangentially, the thread will be coincident with the vertical through the corresponding center of buoyancy for any angle of heel and will consequently represent the line of action of the buoyancy.

The distance between the two threads thus shows to scale the magnitude of the actual righting lever at all angles of heel, and for the purpose of observing this dimension a small scale of feet is attached to the gravity thread.

With regard to the plate *M*; as the metacentric evolute changes with change of draft, a series of these plates is supplied for any particular vessel, each plate representing a mean evolute over a relatively small interval of draft. It is found in normal forms of ships that 12 inches is a suitable interval, and the total range of draft which the supply covers extends from the lightest "arrival" condition (i. e., with all coal consumed and a cargo load in accordance with the lowest scale laid down in the deadweight columns on the chart) to the freeboard condition. To facilitate ready adjustment each plate has the interval of draft to which it corresponds engraved on it, thus (23—24), (24—25), or (25—26), as the case may be.

The feature of the apparatus remaining to be described is the arrangement for indicating the position of the waterline at moderate angles of heel. The point *A*, Fig. 2, about which the section pivots is a mean position of the center of curvature of flotation, the question of the fluctuation or assumed permanency of which is discussed in a subsequent paragraph. *B B* is a horizontal beam passing through a slot in the standard supporting the section, and capable of vertical adjustment to any required draft when

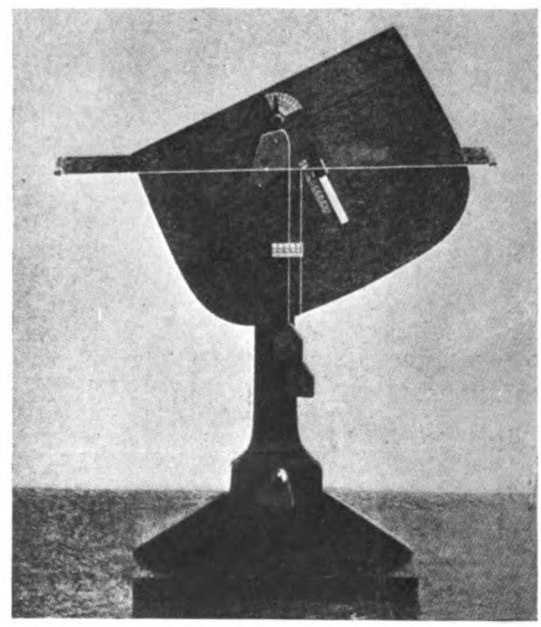


Fig. 6.—Photograph of Indicator

the section is in the upright position. A thread connecting the extremities of *B B* stretches across the face of the section so as to represent a waterline. Then, having adjusted *B B* so that the thread coincides with the particular draft before inclination, and assuming that the curvature of flotation is an arc of a circle up to angles of 30 degrees, the thread will indicate the position of the waterline as the ship is displaced through this range of angles.

Reverting to the point *A*; in many forms of vessels the C. C. F. (center of curvature of flotation) of successive drafts between the "arrival" and deep load conditions varies so little in absolute height that a mean fixed position can be allocated to it. This greatly facilitates construction and working of the apparatus, as will be inferred from the reproduction of photograph shown in Fig. 6.

In many other forms of vessels, however, especially in cargo ships, the absolute height of C. C. F. varies considerably, and therefore an adjustment of the point *A* becomes necessary to secure greater accuracy of result. Figs. 3—5 illustrate the adjusting device. A guide *a a* fixed to the back of the section accommodates a sliding piece *d* which can be adjusted to any required height by a screw and nut arrangement working in a slot *n n* in the guide. A pin *f* of square section fits into a swivel piece *g*

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

attached to but free to rotate in the vertical post of support, and the pointer h keyed to g indicates degrees of heel on the protractor already referred to.

The actual adjustment of A is controlled by a gage as shown in Fig. 3, which indicates the mean position of the C. C. F. over each of the 12-inch intervals of draft, for which the M plates are provided. Thus, if a vessel were floating at a draft of 24 feet 6 inches the M plate marked (24-25) would be placed in position and the slide d adjusted until its top edge were coincident with the mark (24-25) on the gage.

The value of this indication of the waterline at moderate angles of heel is apparent, as simultaneously with an observation of the righting arms, there is provided a visual representation of the position of the deck edge relative to the waterline.

To illustrate this, the case of a shade deck vessel with openings between the upper and shade decks might be given. The vessel has a beam of 53 feet and a freeboard of 5 feet 9 inches. The range of stability is 84 degrees and the maximum righting moment occurs at 45 degrees. At 13 degrees the upper deck edge would be awash, and at 20 degrees the water would pass through the after openings in the side. This aspect of the condition of the ship is not observed in the ordinary curves of stability, but is readily suggested by the apparatus described.

Of the limitations of the apparatus the author is fully aware, but where otherwise complete absence of knowledge might exist, it provides a means of obtaining accurate results appropriate to most of the great variety of conditions in which ships are liable to be found. An endeavor has been made, too, to make the apparatus and its operation as descriptive as possible, so that masters with "extra" certificates and other officers possessing an elementary knowledge of naval architecture may have a clearer comprehension of the part of the problem of stability concerned.

Cast Steel Ships

BY MYRON F. HILL

ACCORDING to latest accounts from England, ship losses of the Allies approximate 3,600,000 tons in six months, not including damaged ships laid up for repairs. Construction has amounted to 200,000 tons per month, leaving a net loss of 2,400,000 tons in six months, or 4,800,000 per year. The German admiral declares this will win the war for Germany.

Granted that the United States is reducing the net loss by increased construction, it nevertheless appears to be true that the increasing transportation requirements for throwing our strength into the war are not yet yet forthcoming. When America is faced with a problem and realizes its gravity, however, it is half solved.

There are many limitations to shipbuilding, and chief among them are the lack of skilled labor. Shipbuilding as now carried on requires expert knowledge of joints and laps, rivets and bending of plates, assembling of the right plates and of the right dimensions in the right places, and countless other factors requiring long training and experience. Other limitations, such as materials and facilities, are more quickly available—if necessary.

In an effort to brush aside the skilled labor difficulty the cast steel ship has been designed. It is formed in sections for casting, and the sections are welded together. No skilled labor is required because the brains are in the molds.

Cast steel has the same tensile strength and elastic limit as rolled steel, and a trifle more. Elongation is the same, but as the steel requires no bending this is of minor importance. Cast steel ships weigh less than riveted ships. All rivets, brackets, angles, straps and other connection metal is saved. This adds 10 to 15 percent to the tonnage that can be built from available steel—and steel is precious.

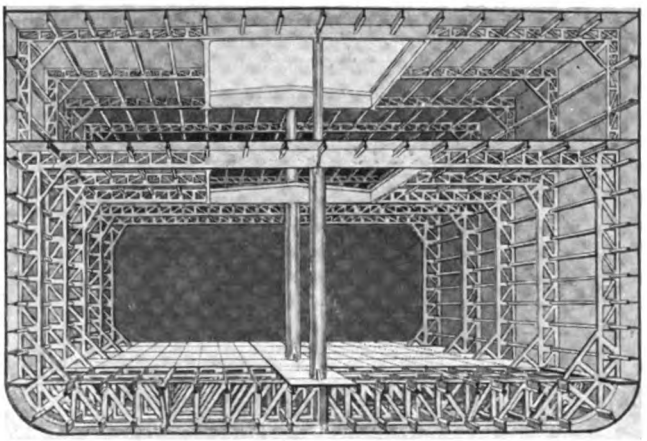


Fig. 1.—Section Through Cast Steel Ship

Welded joints are as strong as the steel itself. The most carefully made five-row riveted joint is only 95 percent strong. The welded ship is therefore 5 percent stronger for this reason, and stronger also because lighter. Further saving of metal is therefore possible when Lloyd's rules are modified to fit the proved factors.

Ship girders when cast in the form of trusses establish the form of the ship, and the plating, decks and tank top may be cast with the trusses as indicated in the figures or may consist of plates welded to the trusses. If cast with the trusses the latter may be located at the edge of the plating or in the middle.

The intermediate longitudinals may be cast with the plating in very heavy ships, or rolled as usual, cut off to space the trusses apart and welded to them and to the plating in spots. In this case the trusses are cast separately in sections and welded together. They are labeled in the molds, designating their location in the ship. A schoolboy accustomed to engineering toys could supervise their assembly.

Castings vary slightly in contraction. Large numbers of them are duplicates and are sorted according to size to fit closely. When building a number of ships at the same time this assorting process provides castings that fit each other sufficient for welding.

By casting the trusses alone, casting is reduced to the

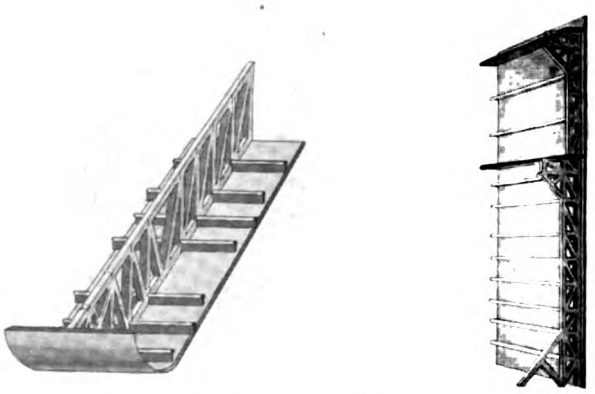


Fig. 2.—Typical Cast Sections to be Welded into the Ship

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

simplest foundry engineering. The transverse trusses may be cast in four sections—two bottom sections meeting at the center girder formed of plates, and two side sections. Deck beams may be cast separately and unite the side sections as the latter are faired up. The longitudinal truss sections may be welded to the transverse girders and the bottom girders held square by welding on the keel plates. The intermediates of rolled bulb angles (omitting connecting flanges) to length are dropped into place on lugs and welded to the girders.

The frame is then ready for laying on the skin, tank top and deck plating. The tank top and deck plates are welded at their edges to the main girders, and by means of punched holes are welded to the longitudinals. For ships of 9,000 or 10,000 tons the skin plating is heavy enough to cast with the trusses, as shown, or with the intermediate longitudinals and then welded to the frames.

The casting of large numbers of duplicate parts facilitates machine molding. Patterns for trusses, or the core or block system for more complex castings may be used, and each man trained in a few months to his particular job. Feminine labor for finishing the simple molds for trusses might be considered.

The cost of casting sections, if the foundry is a big one casting hundreds of ships, is reduced to a figure considerably less than that paid for riveted ships to-day.

Welding may be done by labor that has three weeks' training. The Wilson arc system is efficient, as proved by the experience of the Navy Department in welding the German interned ships. The weld is stronger than the metal that is welded. The cost of welding is insignificant—a few dollars per ton.

Ships can be turned out by this method in a small proportion of the time required by present methods. The ease and rapidity of assembling the frame makes it possible to put a large number of welders at work soon after assembly begins and a ship can be finished in short order. This economizes on ways.

By testing castings with the magnetic system results are certain. Flaws are healed by welding.

There can be no question that Germany knows our limitations in shipbuilding as well as we do, and is banking on them. It is stated that we can now roll 2,000,000 tons of ship plates a year—3,000,000 tons more are vitally necessary.

This is the situation that demands casting plates. Plates, with or without intermediate longitudinals, for ships of 9,000 tons up can be cast, and some of the plates for smaller ships. Furnaces and molds are required. It takes six weeks to build an open hearth furnace. Even blast furnaces may be added to the foundry equipment to handle ore. Two big ones were recently built in fifty-seven days. Molding equipment can be supplied in equal time. Such equipment is the least drain upon the country's resources that will produce the necessary results.

When a large number of cast steel ships are started and we show our ability to meet the submarine losses and provide means to throw our resources into the struggle, Germany will find that its "last card" has been trumped, and then will begin the struggle of the Hohenzollerns to save what they can out of the wreck.

LONDON FIRM TO BUILD CONCRETE SHIPS.—Owing to the impossibility of securing either steel or wooden vessels for their fleet of Miramar motor coasters, Messrs. Pollock, Sons & Co., Ltd., London, owners of these vessels, have decided to construct reinforced concrete vessels. The first vessel to be laid down will be 92 feet 4 inches long, 19 feet beam and 10 feet depth, fitted with a 120 brake horsepower Bolinder "M" type engine. The same firm is also about to build reinforced concrete barges of 130 tons capacity.

Cooling of Magazine or Other Enclosed Spaces by Ventilation*

BY S. B. CROSBY

ON board some vessels there are magazine spaces or other similarly enclosed spaces which are required to be maintained at a lower temperature than that which prevails in the spaces adjacent to the said enclosed space or magazine.

The decks and bulkheads surrounding the enclosed space are provided with insulation and an adequate ventilation system is installed to supply the air to maintain the specified temperature.

A case will be assumed as follows: Temperature of air in surrounding spaces, 110 degrees F.; temperature on deck, 80 degrees F.; temperature to be maintained inside of inclosed space, 90 degrees F.

It will be necessary first to have a line on the rate of heat transmission through the insulated walls. Tests on cork insulation conducted at the Washington Navy Yard show that with 3-inch cork the transmission of heat per hour, in B. T. U., per square foot per degree difference in temperature is 0.19 B. T. U., while with 4-inch cork it is 0.16 B. T. U. Also the transmission of heat through a 1-inch pipe passing through the bounding walls into a given insulated space is 0.282 B. T. U. per hour per degree difference of temperature, while a 2-inch pipe transmits 0.297 B. T. U., and a 3-inch pipe 0.305 B. T. U., thus showing that the losses through a pipe or other small projection is not necessarily proportionate to the size.

Assume that the loss through pipes, hangers, poor joints, etc., is 10 percent additional, and if this percentage is added to the figures given by the Washington Navy Yard experiments, the transmission of heat per hour through 3-inch cork will be 0.209 B. T. U., and through 4-inch cork 0.176 B. T. U. per square foot per degree difference of temperature, and the total transmission will be:

For 3-inch cork $0.209 \times 20 = 4.18$ B. T. U. per hour = 0.07 B. T. U. per minute per square foot.

For 4-inch cork $0.176 \times 20 = 3.52$ B. T. U. per hour = 0.059 B. T. U. per minute per square foot.

One B. T. U. will raise the temperature of 57.4 cubic feet of dry air 1 degree F. at about 80 degrees temperature, but allowance must be made for the humidity in the air, and it is customary to use 55 cubic feet instead of 57.4 cubic feet, hence 1 B. T. U. will be taken up by each 5.5 cubic feet of air, and with the heat transmission previously given, the amount of incoming air at 80 degrees to be supplied per minute to neutralize radiation through 1 square foot of bulkhead or deck surface will be:

For 3-inch cork $5.5 \times 0.07 = 0.385$ cubic feet.

For 4-inch cork $5.5 \times 0.059 = 0.325$ cubic feet.

The quantities given are the minimum required, and for practical purposes about 15 percent should be allowed for unequal distribution; accordingly, for 3-inch cork it is recommended that 0.44 cubic feet of air be supplied per square foot of radiation, and 0.37 cubic feet for 4-inch cork.

It will also be noted that the use of the 4-inch cork insulation is superior to the 3-inch cork and requires a lesser quantity of air and a smaller ventilating system.

* From *The Journal of the American Society of Marine Draftsmen.*

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

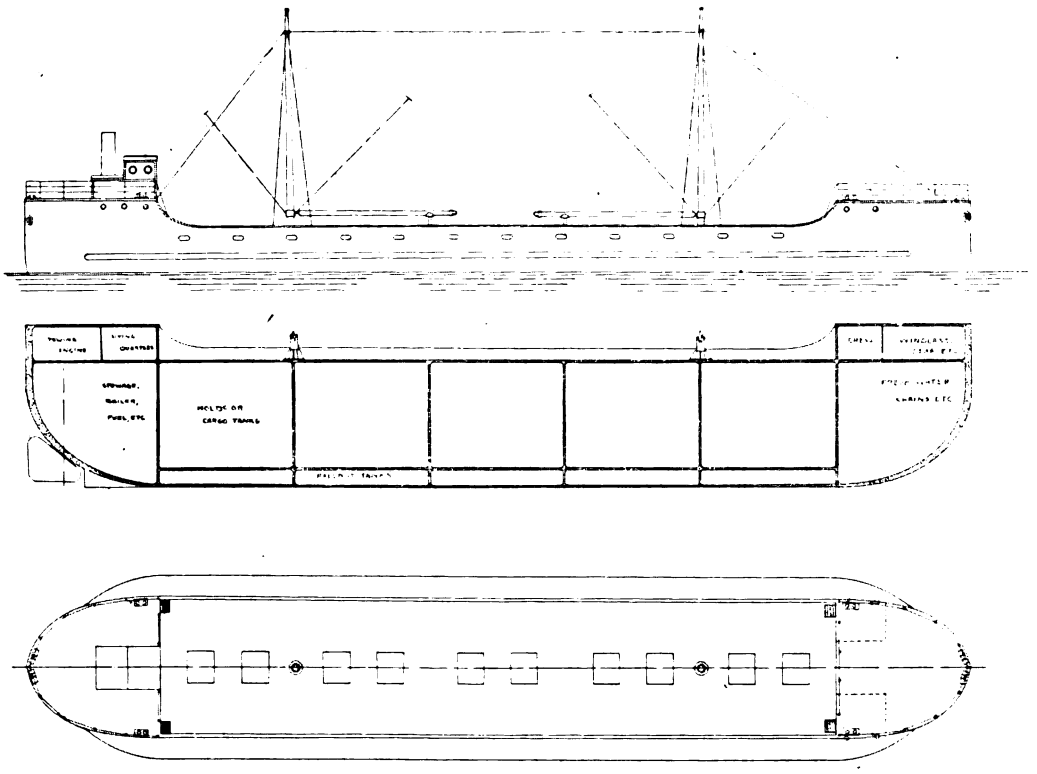


Fig. 1.—Steel Barge with Reinforced Concrete Shell Designed to Carry 1,500 Tons on 17-Foot Draft

Barge Design Involving Bridge Trusses with Reinforced Concrete Shell

Bridge Building Mehods Applied to Barge Construction—Framing Built of Structural Shapes—Shell of Reinforced Concrete or Wood

CLARK & WHITAKER, Inc., 149 Broadway, New York, has a series of designs for bulk freight barges of from 500 to 2,500 tons cargo capacity on which they have applied for patents.

These designs utilize to its full extent the truss principle, instead of the girder on which nearly all ships are built. The truss idea has been used to a certain extent for many years, as in the "hogging frames" of the shallow water boat and in the hogging stringers of some of the older wooden ships, and more recently the center line steel truss in some of the larger wooden schooners.

Truss Principle Utilized

In working out the designs, principles from other brannches of engineering are taken advantage of and the basic idea is to produce a bulk cargo carrier, which can be quickly and comparatively cheaply built, or, rather, manufactured. It was with this idea in mind that they decided to design these barges and employ the bridge truss idea, the trusses carrying all the load and strains and the shell being only a water excluder.

The design shown herewith is for a liquid cargo barge of 1,500 tons, or approximately 10,000 barrels capacity on 17-foot draft. Its dimensions are: length overall, 175 feet; breadth to outside of shell, 34 feet; depth keel to deck, 24 feet.

It will be noted that the fore and aft stresses are carried by two compound vertical trusses, one in each bilge, and that these are also trussed horizontally at top and bottom, forming deck and tank top, and that the transverse bulkheads dividing the hull into watertight compartments are also trussed. These trusses, or the truss as a whole, are very rigid and so proportioned that the tensile strain in any part does not exceed five tons per square inch. This truss or trusses carries all the load except local strains, which are taken care of by the auxiliary frames which carry the skin or envelope. Each frame in itself forms with its bracing another truss against its strain. These are attached to the truss and carry in turn the weight and stresses of the envelope or skin, as the structure of a tall building carries and supports the weight and stresses of its envelope.

Structural Shapes Employed

In order to reduce to a minimum the plant necessary to construct these barges, structural shapes are employed as far as possible with a view to having the steel work fabricated at the mill, knocked down and shipped to the point of erection. With this in view the form of the barge is dead flat for the length of the trusses and for the barge shown, only five frame molds are required. All panels of the trusses can be templeted and repeated, so that the fabricating problem is very simple.

In view of the fact that all strains are carried by the

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

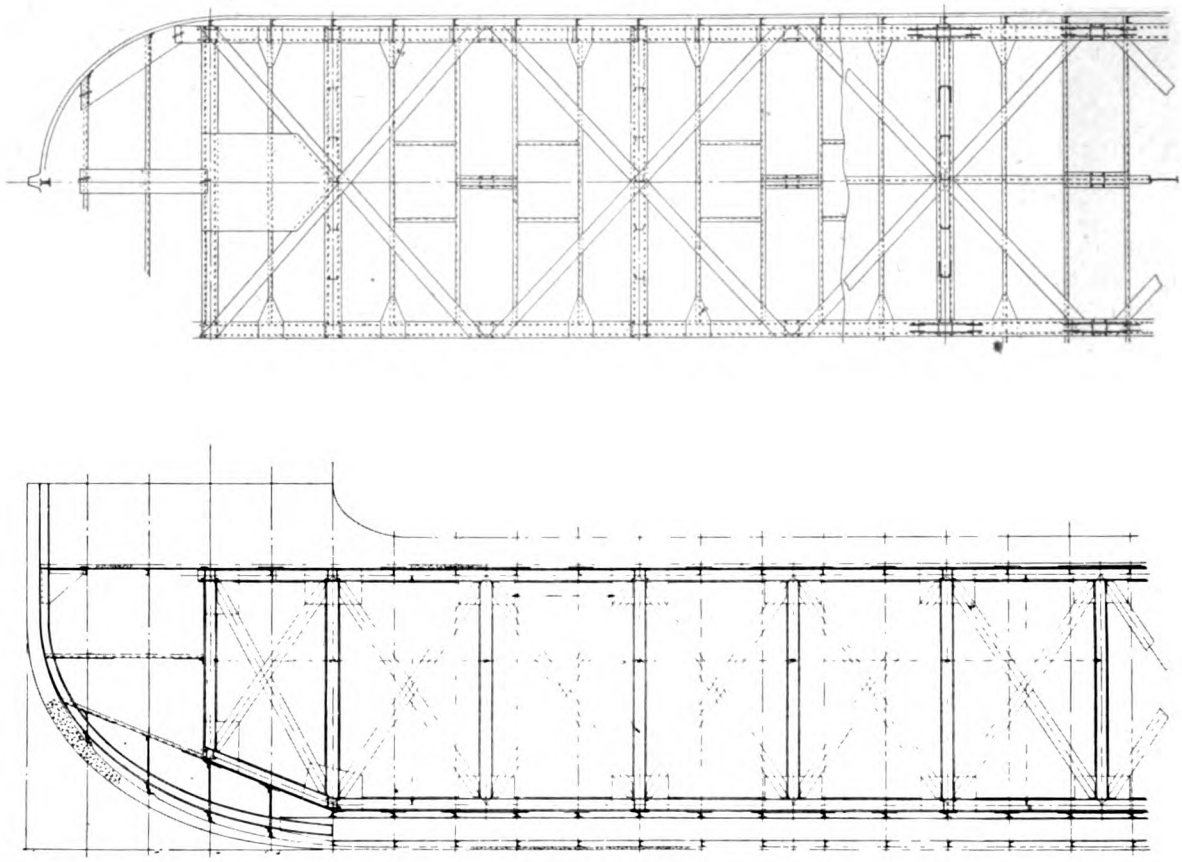


Fig. 2.—Deck and Truss Construction

truss, the importance of the skin or envelope becomes only a question of local strength and watertightness. Any materials having these properties will meet the requirements.

REINFORCED CONCRETE FORMS THE SHELL

Concrete and wood immediately suggest themselves for the purpose. Of the two, concrete apparently has the call, because it can be applied in a fluid condition with a gun, which lends itself to facility of construction, small plant required, and because it is at its best under compression. It has a certain amount of flexibility, greater, in fact, than is required by the rigid backing of the truss. It is easily applied, sets quickly, requires no paint, is noncohesive toredo proof and easily repaired. If properly guarded against blows from docks or bottom, it is practically everlasting.

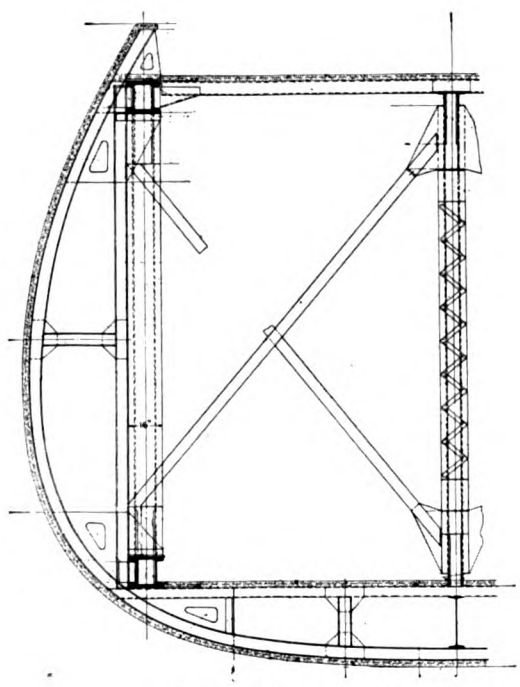


Fig. 3.—Midship Section

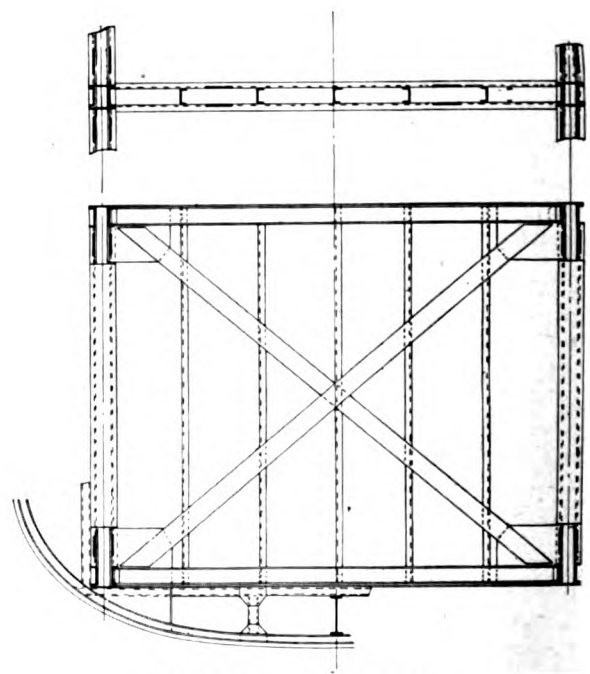


Fig. 4.—Transverse Bulkhead

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

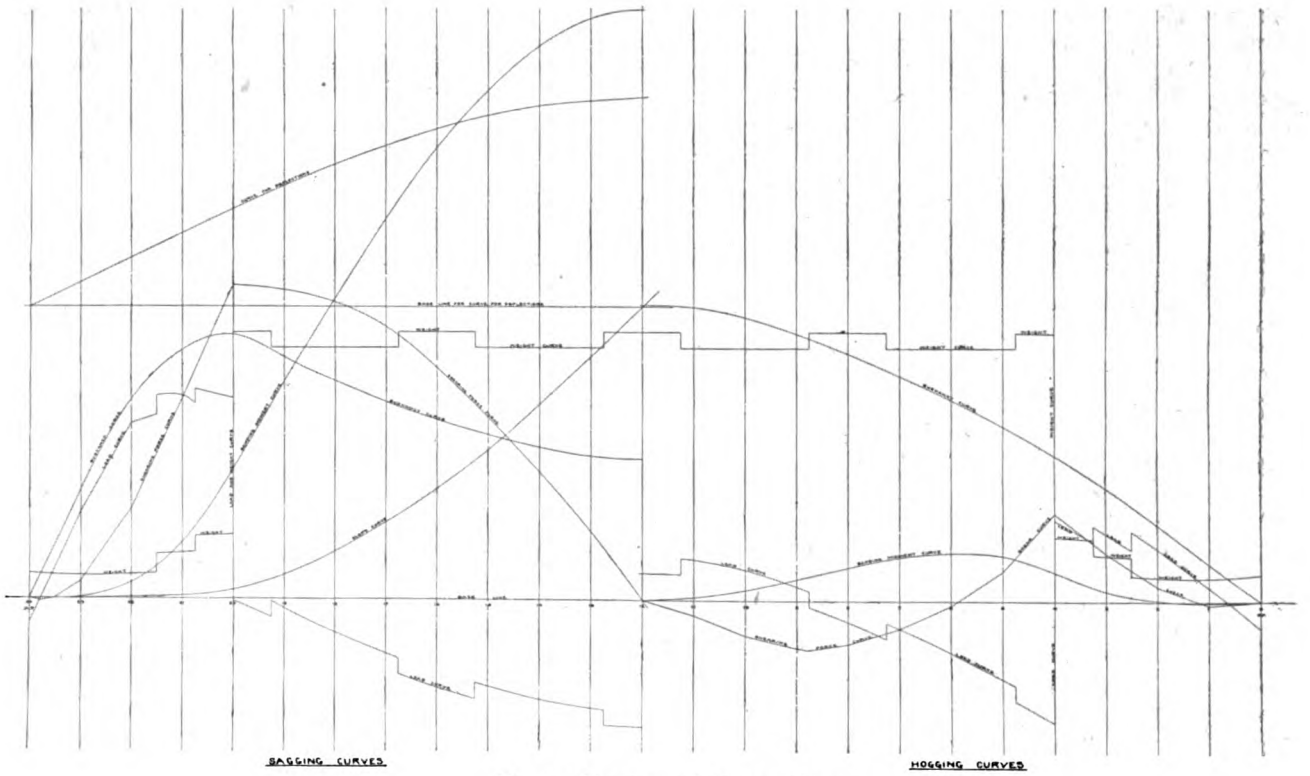


Fig. 5.—Hogging and Sagging Curves

In the design worked out the greatest unsupported area of shell is 10 square feet and no great mass of metal is embedded in concrete exposed to salt water.

The design lends itself to cubical concrete tanks formed by the tank top, the deck, transverse bulkheads and wing bulkheads inside the vertical trusses.

SAVING IN STEEL

In these designs the steel required is practically only 50 percent of that for an all-steel vessel of similar capacity and the total weight of hull only slightly greater than its all-steel counterpart.

It has been found, however, in making calculations for the series, that the steel required to maintain the factor of safety increases very rapidly with the size, which would point to a practical limit of the principle. If it were required to design barges for cargoes other than liquids, the cargo space could be wood-enclosed, reducing the weight somewhat and giving greater cargo capacity, but this under the conditions of to-day would slightly increase the cost.

Welding and Reinforcing by the Electric, Oxy-Acetylene, or Other Processes

Prescribed, by the Board of Supervising Inspectors, United States Government.

All calking edges on internally fired boilers may be reinforced by these processes.

Calking edges of the shells of externally fired boilers, above the fire line only, may be reinforced.

Cracks extending from edge of lap to rivet, except on seams below the fire line in externally fired boilers, may be welded.

Cracks not exceeding 30 inches in length in back connection sheets, wrapper sheets, bottoms of combustion chambers, heads and other stayed surfaces may be repaired by welding.

Where cracks are repaired by welding, holes shall be drilled entirely through the plate at each extreme end of the crack, except in small cracks from rivet to calking edge.

Circumferential or lengthwise cracks not exceeding 16 inches in length in plain or corrugated furnaces may be welded.

Where plates in back sheets of back connections, wrapper sheets of sides and bottoms of back connections of any boilers, side sheets and legs of furnaces and bottoms of furnaces of firebox boilers, and other stayed surfaces are reduced in thickness not exceeding 40 percent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 200 square inches in any one plate.

When such reinforcing extends over stays and braces, such stays and braces shall come completely through the reinforcing so as to be plainly visible to the inspectors.

When the corroded portion of stayed or riveted surfaces of the back sheets or wrapper sheets or bottoms of back connections of any boilers, or side sheets and bottom sheets of furnaces or legs of firebox boiler exceeds 300 square inches, the same may be repaired by the removal of the corroded portion and the replacement thereof by a new piece of plate, the edges of the new plate being welded in position.

Staybolts, braces or rivets shall pass through the body of the new plate as before, the area of the new piece not to exceed 24 inches by 24 inches, or 30 inches, in any one direction, the welded edges to be V'd or beveled along the joint prior to welding.

Where plates of shells and other parts of internally fired boilers subject to tensile strain are reduced in thickness by corrosion not to exceed 25 percent of the original thickness, they may be reinforced, such reinforcing not to exceed an area of 200 square inches.

Where calking edges and laps have been reinforced,

Generated on 2024-08-12 19:16 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

local inspectors shall require the rivets to be cut out and redriven if they find by inspection that it is necessary.

No welding shall be allowed in cracks in the shell plates or other plates subject to tensile strain.

Cracks extending through rivet holes in single-riveted or double-riveted seams in stayed surfaces of back connections of any boilers or side sheets of legs or bottoms of firebox boilers which are stayed surfaces may be welded up to a length of 6 feet exclusive of rivet holes.

Where cracks extend through rivet holes in stayed surfaces, the piece extending from the rivet to the edge of the lap may be removed where convenient to do so, and the place where the piece has been removed may be replaced by being built up and reinforced by either of these processes.

WELDING LEAKY STAYBOLTS

Where leaks develop around staybolts and the staybolts are otherwise intact, the nuts may be removed from the ends of the staybolts and the staybolts may be welded into the shell by welding a beveled collar or ring around the staybolt. The width and depth of such collar shall equal one-half of the diameter of the staybolt. In all such cases of applying welding rings or collars around staybolts, the material shall be hammered while in a glowing state as it is applied.

In all cases where metal is deposited on stayed surfaces, the operator shall hammer, when practicable, the deposited metal while it is in a glowing state.

No repair work by any welding process shall be allowed until coupons showing the character of the work proposed to be done by the applicant have been tested and submitted, together with an explanation and report of the test, to the local inspectors of the district where the work is being done. The local inspectors shall then satisfy themselves whether or not such process can be used with safety on the boilers of steam vessels.

In every case where repairs are to be made by these processes on the boilers of steam vessels subject to the inspection of this service, the parties making the repairs are required to notify the office of the local inspectors, in writing, giving a full detailed description of the repairs to be made, the location of the vessel, and the time the repairs are to be begun, so that inspection may be had, if practicable, prior to and during the time the work is being done.

The application for permission to use this process on boiler repairs of any particular vessel implies a guaranty on the part of the applicant that the work shall, in material, flux and workmanship, be equal to that of the samples furnished.

WELDING WROUGHT OR CAST STEEL PARTS

Cracks in wrought iron or wrought steel headers, and cracks or sand holes in cast steel, semi-steel, ferro-steel, malleable iron or cast iron headers, manifolds, crosses, tees and ells may be repaired by welding cracks or flowing metal into sand holes. Such repaired material other than headers and manifolds shall be subjected to a hydrostatic test of three and one-half times the working pressure after such repairs are made. Reinforcing by building up of any of the above-mentioned articles other than headers shall not be allowed.

When crown-bar bolts have deteriorated or wasted away at top of combustion chamber under the crown bars, such deterioration not to exceed 25 percent of the original diameter of the bolt, such bolts may be built up or reinforced by any process of autogenous welding.

Where tube sheets of boilers have deteriorated not to exceed 25 percent of their original thickness, or where cracks have developed in tube sheets, the same may be reinforced and repaired by any process of autogenous welding, and the beading on the ends of tubes may be welded to the tube sheets by the same process. (Secs. 4405, 4418, R. S.)

Chart for Staying Flat Surface of Boilers According to Lloyd's Rules

BY A. F. MENZIES

Most of the formulas used in boiler design are used only once in connection with any particular design. Those for flat surfaces, however, are used several times. In order to lessen the labor involved in figuring out each variation of the flat surfaces, the accompanying chart has been prepared.

The chart is based on Lloyd's Rules for the construction of marine boilers, and includes all the ordinarily used constants. To illustrate its use: Suppose the steam space stays come in conveniently at 18-inch centers, stays to be secured with double nuts and outside washers which are to be two-thirds the pitch in diameter and one-half the thickness of the end plate, the working pressure being 180 pounds per square inch.

Start at the top of the chart at 18-inch pitch and drop vertically to the correct constant, which, in this case, is 185 for steel plates. From the intersection with this constant line run horizontally to the 180-pound pressure line. From this intersection drop vertically to the plate thickness at the bottom of the chart, which will be found between 1 3/32 inch and 1⅛ inch. The latter thickness will, of course, be used. The dotted line illustrates the above example.

By reversing the operation the chart can be used to find the maximum stay spacing, which can be used with any given plate thickness, method of securing the stays and working pressure.

In Busy Times

Nearly all shipbuilders are working their machine shops both day and night; this calls for a class of machinists who must be able to pick up the other fellow's work at any point of its progress. It may be in the midst of a finishing cut or a half set up job in the machine. When the shift whistle blows, the day man must pick up the night man's work, and vice-versa. That a great deal of work is not spoiled, or that a considerable amount of time is not lost in making this shift, speaks well for the skill of the class of machinists that are turning out the varied class of work which comprise the component parts of many types of marine engines and their auxiliary machinery.

When mistakes are made or some work spoiled it is rather difficult to place the blame. The following illustrates this: A large tail shaft was being machined; the night man had roughed out the last cut and left just enough for finish—it was the taper end of the shaft to which the propeller is fitted. The day man relieved him and made the finish cut. When the template of the bore of the propeller was tried it was found that the shaft was out 1/16 inch in the taper. As the propeller had already been bored, one of the two had to be condemned, and of the two, the inspector condemned the shaft. The day man claimed the night man had told him the taper attachment was set all right for the correct taper. The night man claimed he left a big roughing cut and had not said that the taper was set correctly. Neither of the men was discharged.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

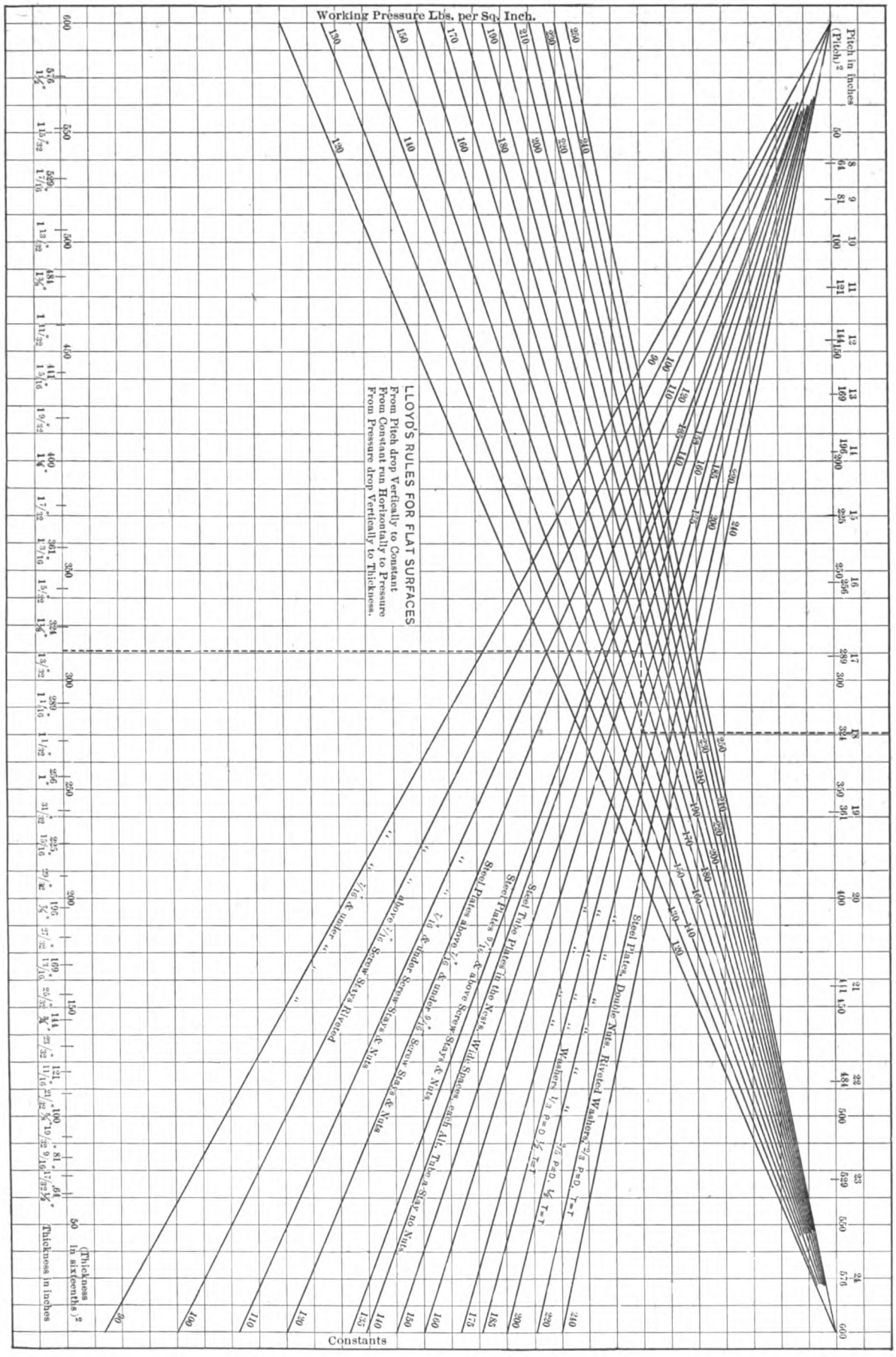

Working Pressure Lbs. per Sq. Inch.
Pitch in Inches (Pitch)²
LLOYD'S RULES FOR FLAT SURFACES
From Pitch drop Vertically to Constant
From Constant run Horizontally to Pressure
From Pressure drop Vertically to Thickness.
Steel Plates, Double Nuts, Rivets Pitch = 8/8 P=D, T=T
Steel Plates, Double Nuts, Rivets Pitch = 7/8 P=D, T=T
Steel Plates, Double Nuts, Rivets Pitch = 6/8 P=D, T=T
Steel Plates, Double Nuts, Rivets Pitch = 5/8 P=D, T=T
Steel Tube Plates to the Nuts, Washers 1/8 P=D, T=T
Steel Plates, Screw Stays & Nuts, Washers 1/8 P=D, T=T
Steel Plates at above Pitch, Screw Stays & Nuts, Washers each Side, All Tube & Stay no Nuts
Steel Plates at above Pitch, Screw Stays & Nuts, Washers each Side, All Tube & Stay no Nuts
Steel Plates at above Pitch, Screw Stays & Nuts, Washers 7/16 & under 9/16,
Steel Plates at above Pitch, Screw Stays & Nuts, Washers 7/16 & under 9/16,
Steel Plates at above Pitch, Screw Stays & Nuts, Washers 7/16 & under 9/16,
Riveted
Constants
Thickness in inches
Thickness in sixteenths (Thickness)²

Chart for Designing Staying for Flat Surfaces of Boilers According to Lloyd's Rules

Generated on 2024-08-12 19:16 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Why Is a Concrete Ship?

Advice from a Veteran Ship Draftsman as to the Design of a Reinforced Concrete Ship

MORE overtime! What is left of our office force has again gone stale. The "bush leagues" have drawn heavily on us and structural men and conscription dodgers that have been taken in avail but little. In the vernacular of baseball, we are known as the major league, and because of our good standing and organization many of our men have been coaxed away and made pitchers in these bush leagues. More work and less men—hence the overtime. The yard is close on our heels and there is more or less confusion.

Old Mac had grown irritable until he became genuinely tired out. He is now more or less indifferent, and I often see him gazing out of the window—day dreaming. Noticing this to-day, I suggested as I passed that I would give him a "penny for his thoughts."

"You see that switch engine over there?" he answered. "Well, every time it comes around here and blows its whistle I get to dreaming. Most of these dreams are connected with some of my experiences up North. For some time I could not figure out what the whistle had to do with it, until I remembered how, when I was convalescing from an operation for appendicitis and could not sleep very well, I used to mark the passing of the small hours of the morning by the whistle of a freight train that would come along and blow just as it got out of the timber and into the clearing in front of the hospital. This switch engine is the same one that pulled that freight, or it has the same whistle, and I am just about as "pepless" as I was when that "doc" up there gave me a knockout with some of his nasty ether. I am tired out. My thinker, unguarded and deserted by an ordinarily alert interest in surroundings, is exposed to some such remote influence as that whistle, which has uncovered experiences of no importance and long ago forgotten."

"How about licorice powder, Mac?" I asked.

"No good. It has lost its effect. 'Johnny Walker' helps out some, but I think that the only way is to have that whistle tuned up or down enough to keep its waves out of my wireless. Some day not very far off I am not going to show up here, but instead I am going to beat it up into the timber and fish. Do you like to fish?"

"Not particularly, Mac," I answered.

"Well, then, you have not a philosophical mind. No use to talk any more to you."

That evening after dinner and when the disinclination to work is strongest, young Stevens went over to Mac's board and gave him a letter that had been directed to Robert Duncan and was now marked across the front with red ink, "Killed at the front—Major W. S. Return to sender." Bob Duncan was a fine, manly young fellow in the loft and a close friend of Mac and Stevens. A sister in the old country had written him a rather caustic letter, in which she referred to him as a "slacker," and he promptly enlisted in a company of Scotch engineers. The returned letter was one that had been sent in answer to the first of his from somewhere in France. Bob had come into the office often before he went away and was a general favorite. Mac was depressed and did not say much until Stevens asked him if he would show him how to lay out a concrete ship.

"There ain't no such animal," Mac replied.

"'Old Man of the Sea' says they build them in Norway and that a Frenchman built one in France in '49' that is still afloat."

"What has 'Old Man of the Sea' got to do with concrete ships? Is he going to try and build one?" asked Mac.

"Yes; he is naval architect for a new company that is made up mostly of concrete contractors around town."

"Where do you come in on it?"

"'Old Man of the Sea' wants me to draw up the plans. He says he always figured Tek to be the brainiest man in the office, so he started him in on the job. Tek has been a month figuring out the shape of a wave so that he can calculate the hogging and sagging strains. 'Old Man of the Sea' can't wait any longer and the concrete men want the plans. He wants me to help Tek out. Tek is too deep for me and I will have to go it alone, I guess, or give it up."

"See it through. You can get by 'Old Man of the Sea' and those strong-backed mud-mixing friends of his all right. When did all this happen?"

"Tex has been working on it a month."

The Concrete Ship

"Well! What do you know about that 'Old Man of the Sea'? You have got to give the devil his due, though. Skinning those Swedes. Naval architect! Pretty slick nut after all, isn't he? What is he going to tackle first—a submarine or a destroyer?"

"A 250-foot coaster."

"That is reasonable. Is he going to pay you for your trouble?"

"He said he would."

"How much?"

"He did not say just how much."

"Well, now; the first thing for you to do is to have that definitely understood. You are a draftsman—ship draftsman—not an angel for a bunch of nuts. Don't be a sucker! These things don't come often, so get double time—cash. Get your money at the start, the way the real estaters do. Remember, the way of the inventor is hard. The bookkeeper told me the other day that Dun and Bradstreet's man had told him that only 2 percent of business ventures are successful, and that, on the average, four men fail before the fifth man makes a go of it. 'Old Man of the Sea,' if he is lucky enough to be among the 2 percent, will have to go broke four times before he makes good. Some handicap!"

"Don't you think a concrete ship is possible?"

"Yes, it is possible, but a costly experiment, though. You are a draftsman—not a promoter—and $250,000 is more than you or I can lose."

"What will I do, then?"

"Tell 'Old Man of the Sea' you will do the job for him for $1 an hour. That is cheap. Labor is paid first in this State; don't work for a lump sum, which might be considered as an open account payable in sixty days or never. I remember once how I took a chance on half the profit on a propeller design, and came near dividing a loss. The other fellow kept the account.

"Well, the first thing to do is to make up an outboard profile. Go down to the vault and select something near what he wants. Copy it bodily. Show in some wet water, a stockless anchor, some fat lifeboats, a couple of

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

masts and a wireless; a waving flag, a searchlight with numerous expanding rays of light shining out of it; shade up the windows; show in the rail and stanchions, etc., and, above all else, make an alluring title having 'Old Man of the Sea's' real name the most important thing in it. Designed by ————, naval architect. Find out his middle name and any fancied title he may have. Put them in also. Put on a fancy border. Call the ship the *Ferro Concrete*.

"Get him a blue print and tell him that if that is what he wants you will go ahead with the lines and midship section. Keep the tracing until he pays you the first instalment. The minute he sees it he will want a lot of prints to hang up home and around town in the promoter's windows."

"Then what?"

"Wait until he gets all fussed up and begins to stretch his hatband. Wait until his friends want to know how much the *Ferro Concreto* is going to cost; how much she will carry, and how fast she will travel. Then get out the lines and the midship section."

"How will I do that?"

"Get out a section for a steel vessel of the same size. Then make an equivalent section for the reinforced concrete ship. Don't bother with any hogging or sagging calculations. Don't bother with any equivalent girder considerations. These classification societies did that long ago: got the decimal point wrong, missed the mark, corrected their sights, got the range and now hit the mark with regularity. You can lean on them to advantage, and it may help 'Old Man of the Sea' to get insurance, if he ever gets his ship into the water."

"But, how will I make this equivalent concrete midship section?"

Equivalent Concrete Midship Section

"Your concrete ship will have to have about the same area of reinforcing steel in the section as the steel ship has steel area. You can get along with less, come to think about it, because the efficiency of joining the reinforcing bars is unity, while all the longitudinal strength members in a steel ship are cut and weakened by a line of non-watertight rivet holes. A plate butt is only 60-80 percent efficient, and a ¾-inch rivet hole cuts out 25 percent of a 3-inch angle flange. The disposition of the reinforcing steel in the concrete ship should be about the same as it is in the steel ship."

"Don't the concrete help at all?"

"Only in compression. A ship at sea is subjected alternately to hogging and sagging strains as she passes over the crest of a wave. The longitudinal reinforcing then has to resist tension (as its worst condition) alone and without the help of the concrete, because when the reinforcement is stressed the concrete is cracked in an infinite number of minute cracks—pieces of concrete strung on the reinforcing, like doughnuts on a string.

"A job like this is an experiment, and the best way would be to distribute the reinforcing steel in about the same location as it is in the steel ship, and having about 80 percent of the area of the steel plates and shapes in the steel section.

"The concrete in the shell is not doing much good as a longitudinal strength member, and you can't work it much less than about 4 inches thick, so that the best way will be to figure your transverse strength members on a wide spacing. Sort of half way between a transverse framed ship and an Isherwood ship. Go and get one of those concrete floor slab hand-books that the reinforcing and expanded metal fellows give away and determine upon a frame spacing that will accord with the thickness of your concrete shell and the water pressure per square foot due to the depth of water submersion, and which in this case will be what they call floor load. At a guess, I would say that this might be about 4 feet. Work out the deck in the same way as for a floor slab.

"Make the concrete frame equal to the steel frames in the 4-foot space, or whatever this space works out to be. Do the same with the beams.

"The area of reinforcing steel in your longitudinals and stringers can be reduced about 20 percent below that of the steel ship, because these members are no longer intercostal, the concrete at the intersection with the floors making them as one piece. For this reason the intercostals should be as heavy and stiff as the frames."

"How about the mixture of the cement? Tek says that this is very important, and 'Old Man of the Sea' says he is going to use a secret German compound that will strengthen and waterproof the concrete."

Mixture of the Concrete

"More bunk! Mud is mud. Where is 'Old Man of the Sea' going to get his compound? Maybe the Germans will send him over a load in a submarine. Say, you know that city chemist who comes over in the evenings to play chess? Well, he tests all the cement, concrete, etc., for the city, and is in a position to judge pretty well the merits of all such claims. He tells me that the best concrete is the concrete that is the densest. It is more nearly waterproof and has the greatest resistance to shearing. Concrete in compression fails by shearing, you know. It slides off at an angle to the vertical. Now, he says that to make concrete dense all that is necessary is properly to grade the rock, gravel, sand and cement. He determines this by what he calls a mechanical analysis of the materials to be used. He runs them through screens of different sizes, and in this way finds out how to fill the voids or spaces in the rock with gravel, in the gravel with sand (sometimes there are two kinds or sizes of sand), and in the sand with cement. Sometimes he puts hydrated lime in to fill up the cement voids. This, perhaps, is 'Old Man of the Sea's' German magic. He says that this is good concrete and that about all these compound men do in the way of waterproofing is to show some botcher how to make fair concrete, getting their pay in the sale of some compound—secret and mysterious. 'Old Man of the Sea' had better get this fellow to grade his aggregate for him."

"Everybody says a concrete ship will be too rigid and will not be elastic. Is that so?"

"No; reinforced concrete is elastic, if well proportioned. High tensile steel and concrete have about the same coefficient of elasticity. When somebody was figuring out coefficients of elasticity he noticed that these two were the same nearly, and this suggested the combination. Sure, a concrete ship will be elastic. That is not the thing to be pessimistic about, however.

Hull Fittings Cause for Worry

"What would worry me would be the development of the thousand and one details that come up in the finishing up of a ship, such as watertight doors in bulkheads, openings through the shell, such as sea stools, air ports, bollard, belt and cleat fastenings, foundations for main and auxiliary machinery, rail stanchions, rudder and sternpost connections, etc. How about fresh water and oil tank, bulwarks and rigging details? All these things must be worked out correctly before the work is started, because the mud must be poured as nearly continuously as possible. A leaky sea stool or a loose pintle connection

Generated on 2024-08-12 19:55 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

can only be reached in a dry-dock, and concrete once set is a refractory thing to work. You know how hard a time they have keeping lights in sidewalks. In a steel ship a few drilled holes and a rivet or two and a dependable job is the result.

"Your ship will be heavy, too. You will have to figure this weight roughly before you can finish up the lines."

Old Mac was interrupted at this point by a bark, followed by one agonized howl. We all recognized the bark as that of "Bob," the dog that belongs to us all, but that nobody owns. He lives from lunch contributions at noontime from the men around the yard. He has a route, and his numerous friends keep him well fed.

Sunday is a hard day for "Bob," because there is little or no lunch. This very morning, Monday, having had but little to eat yesterday, he came into the office begging. Casey had brought some tomales for his lunch and had given "Bob" one of them. At first he was shy, but he finally gulped it down, and soon, feeling the warming stimulus of the chili, with head and tail erect went on his beat around the yard.

I had never heard "Bob" howl before. He had been in numerous fights and in lots of trouble, but I had never heard him howl. We all looked out of the window. There was a crowd around the yard truck, which had stopped in the street in front of the office. Sport, another dog and a bosom friend of "Bob," had hold of "Bob's" collar with his teeth, and was trying to pull him out from under the back wheel of the truck. The driver was rattled. He had stalled his engine. To get the gear in the reverse he had, after starting the engine again, to go a little more ahead. "Bob" was finally gotten out, but he was so badly maimed that his friend the policeman had to perform an unpleasant duty and put him out of his misery.

Old Mac walked over and put on his hat and coat. He was upset, and went out without saying a word. I can imagine what Mac saw, perhaps, in that truck and its ruthless driver. Two "Bobs" at one time is a terrible reminder of what is going on over on the other side of the world.

Yes, Mac went fishing.

Steamboat-Inspection Rules Amended

The Steamboat Inspection Service has issued a circular letter dated August 24, 1917, addressed to inspectors of the service, boiler manufacturers, manufacturers of boiler plate, and steamboat companies, containing amendments of the general rules and regulations of the Board of Supervising Inspectors, and approval of vessel equipment and boilers, as adopted by the Executive Committee of the Board at a meeting held from August 15 to 22, inclusive, 1917.

TENSILE STRENGTH, STEEL BOILER PLATES

The restrictions relating to tensile strength required for steel boiler plates as contained in amended rules were struck out of the rules and regulations by the following amendment:

Section 5 of Rule I, General Rules and Regulations, all classes, reading as follows, was struck out:

"The tensile strength determined by the tests shall be not less than 58,000 pounds per square inch of section, nor more than 73,000 pounds per square inch of section, and the elongation measured in a gage length of 8 inches shall be not less than 20 percent."

And the following paragraph was substituted therefor:

"All steel plates tested shall show an elongation of at least 20 percent measured in a gage length of 8 inches."

AREA OF SEGMENT OF BOILER HEAD—FLAT-SEAT SAFETY VALVE

The following paragraph relating to determining the area of segment of boiler head was struck out:

"The area of the segment of a head to be stayed shall be that surface contained within a line drawn 3 inches from the inner circle of the head and 2 inches from the tubes or flues."

The following rule for determining the discharge capacity of a flat-seat safety valve was adopted:

"The discharge capacity of a flat-seat valve shall be one and four-tenths times that allowed for a bevel-seat valve."

LICENSE REQUIREMENTS RESCINDED

Owing to the excessive demands for officers of merchant vessels, created by the exigencies of the war, experience and examination requirements for license as master, mate, pilot and engineer of merchant vessels, as contained in sections 20, 21, 22, 23, 26, 31 and 32 of Rule V, General Rules and Regulations, both in Great Lakes and river rules, were struck out, and the issue of licenses to officers of vessels within the classifications referred to was left by rule to the judgment and discretion of the local inspectors, as vested in them by law, the sufficiency of the experience of an applicant for license to be determined by the local inspectors when applicant applies for examination for license.

FLANGES MADE BY BETHLEHEM STEEL COMPANY

The following resolution approving dimensions of flanges made by the Bethlehem Steel Company was adopted:

"*Resolved,* That the standard dimensions of cast iron, composition and wrought steel flanges as prepared and submitted to the committee by the Bethlehem Steel Company for use by the shipbuilding plants of that company be approved as meeting the requirements of the general rules and regulations relating to flanges. Copies of the blue prints covering drawings and dimensions as submitted to the committee must be furnished by the Bethlehem Steel Company to each supervising inspector and each board of local inspectors of the district in which the plants of the company may be located."

VESSEL EQUIPMENT AND PIPE BOILERS APPROVED

The following-described vessel equipment was approved:

Childs fire extinguisher, presented by O. J. Childs, Utica, N. Y.

A B C life raft, presented by the Welin Marine Equipment Company, Long Island City, N. Y.

Universal ilanasilk, ring life buoy, presented by Robinson-Roders Company, Newark, N. J.

Universal ilanasilk, jacket life preserver, presented by Robinson-Roders Company, Newark, N. J.

Under the provisions of Section 4429, R. S., the following-described pipe boilers were approved:

Emergency Fleet Corporation's standard watertube boiler, presented by the Emergency Fleet Corporation, Washington, D. C.

Foster marine boiler, presented by the Power Specialty Company, New York, N. Y.

Meier boiler and Meier superheater, presented by the Heine Safety Boiler Company, Phœnixville, Pa.

The action of the Executive Committee received the approval of the Secretary of Commerce on August 22, 1917, under the provisions of Sections 4405 and 4491, Revised Statutes.

Generated on 2024-08-12 19:11 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Notes on Rudders

Stresses in Rudder Stock—Rudder Area—Formulæ Used

BY CARL E. PETERSEN*

RUDDERS are of two kinds, *i. e.*, ordinary or unbalanced and balanced rudders. An ordinary rudder is one in which the whole of the area is abaft the axis of the pintles and rudder-head. In balanced rudders some of the area is forward of the rudder-head axis, for the purpose of reducing or eliminating the twisting moment about the axis.

The principal parts of the rudder which require calculations for strength usually are the rudder head, the main piece, the rudder arms and the rudder pintles. The various classification societies and handbooks give empirical formulæ and tables for proportioning rudder parts. There are, however, great differences in the results obtained by the use of the various formulæ available. The best method of estimating the stresses in the rudder stock is to calculate the pressure on the rudder blade and its moment about the axis of the rudder stock by means of Joessel's or Beaufoy's formulæ.

The stresses on the stock, due to the shock of the waves against the rudder blade, may be five to six times that due to putting the rudder hard over in still water. (S. S. *British Prince*, the maximum pressure on gear to put rudder hard over was 5.6 tons at 13 knots' speed in calm, while indicator springs were broken during storm showing at least 30 tons pressure.)

Calculations should be made for statical stresses and a suitable factor of safety used to cover any stress that is likely to occur.

Pressure Formulæ

Joessel's formula for the normal pressure on flat rectangular plates moving through water is:

$$P = 1.622 \frac{\sin\Theta}{0.39 + 0.61 \sin\Theta} - \frac{w}{2g} A V^2 \qquad (1)$$

$$x = (0.195 + 0.305 \sin\Theta) B. \qquad (2)$$

where

P = normal pressure on plate in pounds.
A = area of plate in square feet.
V = velocity of current in feet per second.
Θ = inclination of plate to direction of current.
w = weight of cubic foot of water.
g = acceleration due to gravity.
B = breadth of rudder.
x = distance of center of pressure from forward edge of plate.

For V in knots (6080 feet); $w = 64$ pounds per cubic feet; $g = 32.16$ feet per second—equation (1) then becomes:

$$P = 4.6 A V^2 \frac{\sin\Theta}{0.39 + 0.61 \sin\Theta}$$

and for $\Theta = 35$ degrees, $\sin\Theta = 0.5736$.

$P = 3.565 A V^2$, say $3.57 A V^2$.

$x = 0.368 B$, say $0.37 B$.

In using Joessel's formula we must apply a reduction coefficient for reasons explained later.

Beaufoy's formula for the normal pressure on flat rectangular plates moving through water is:

$$P = 1.12 A V^2 \sin\Theta,$$

where the symbols have the same meaning as above. For V in knots (6080 feet)—

$$P = 3.19 A V^2 \sin\Theta,$$

and for

$\Theta = 35$ degrees, $\sin\Theta = 0.5736$.

$P = 1.83 A V^2$.

Beaufoy's formula agrees fairly well with the results obtained from the various actual rudder experiments. It has been used by the British Admiralty for many years in rudder calculations.

The Joessel formula gives too large pressure values for two reasons—(1) Assuming that at the end of the time used in swinging the rudder the ship would not have changed her course, the final speed V_1 in the direction of the keel would be less than the initial speed V_0, on account of the component of the additional resistance of the rudder in the direction of the keel. (See Fig. 2.)

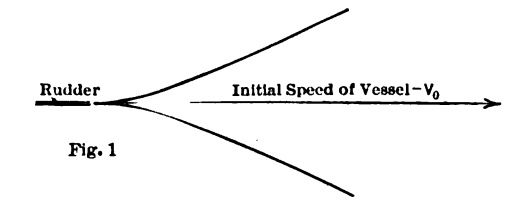


Fig. 1

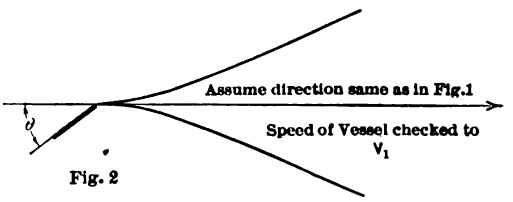


Fig. 2

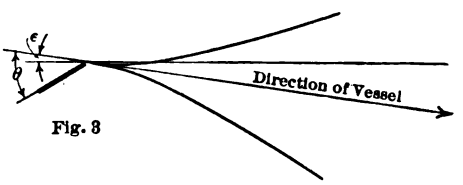


Fig. 3

Figs. 1-3.—Effect on Vessel of Movement of Rudder

(2) At the end of this period the ship has acquired an angular velocity at right angles to the keel which diminishes the angle of incidence of the stream lines on the rudder blade by a certain angle ϵ, and consequently the final moment tending to return the rudder to a fore-and-aft plane. (See Fig. 3.)

Therefore the ratio of the actual final moment tending to return the rudder to a fore-and-aft plane to the moment given by Joessel's formula is:

$$C = \frac{V_1^2}{V_0^2} \cdot \frac{\sin(\Theta - \epsilon)}{\sin(\Theta)} = \text{coefficient of reduction.}$$

The values of the reduction coefficient C must be chosen by judgment from the experimental data available on

* Junior member Society of Naval Architects and Marine Engineers.

Generated on 2024-08-12 19:25 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

other ships. However, approximate values may vary from about 0.50 for a small high-speed vessel to about 0.80 for a large slow one.

In screw vessels, when going ahead, the velocity of the water past the rudder is increased due to the slip and may be taken to be:

$$\frac{\text{speed of vessel}}{1 - \text{slip}}.$$

United States Navy practice is to take the augmented speed at 20 percent, while the British Admiralty uses 15 percent in all cases.

Single-screw vessels are more favorable to steering than are the ordinary twin-screw vessels fitted with one rudder, due to the action of the propeller. In sailing vessels the velocity of the water past the rudder is reduced

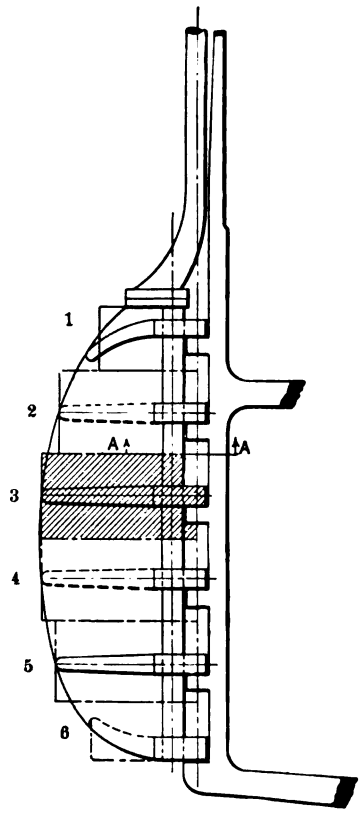


Fig. 4.—Distribution of Pressure on Ordinary Rudder

on account of the frictional wake, which may be taken as 10 percent. Deadwood and full sterns are unfavorable to good turning. In any case the water should have a clean run past the rudder.

Area

Values of area of rudder as a percentage of the immersed longitudinal plane—

Fast ocean liners	1.70
Freighters	1.65 to 2.00
Large naval vessels	2.00 to 2.60
Moderate-sized naval vessels, destroyers, etc.	3.00

In general the percentage increases inversely as the size or speed of the vessel.

Where steam-gearing gears are fitted, with the exception of very slow vessels, any deficiency in rudder area is scarcely noticeable, as the rudder is quickly thrown over to a greater angle than would be necessary if the rudder had the proper area.

As regards shape, for a given area and pressure, a deep, narrow rudder when using moderate angles of helm gives a smaller twisting moment, consequently less power for operating the rudder and a smaller rudder head required than in a wide shallow one. Also the pressure for a given area will be greater for a narrow, deep rudder than for a broad, shallow one. The lower portion of the rudder is more effective than the upper portion.

Rudder area is less in merchant ships than in warships, as there is not the same necessity for large maneuvering powers as in naval vessels. Broader and shallower rudders are used in battleships so as to keep the whole of the steering gear below the waterline for protection.

Stresses

In ordinary rudders, as shown in Fig. 4, where the pressure on the rudder is distributed over so many pintles, the bending moment on the rudder stock is small and practically negligible, and the rudder stock is calculated to resist a torsional stress.

The formula for the twisting moment on the rudder stock is:

$$M_t = f_s Z_p,$$

where Z_p is the polar modulus of the section and f_s is the safe skin stress. Substituting Z_p for its equivalent value for a solid circular section we get:

$$M_t = \frac{f_s \pi D^3}{16},$$

whence

$$D = 1.72 \sqrt[3]{\frac{M_t}{f_s}}$$

Allowable stress on steel stocks of 7,500 pounds per square inch is a reasonable figure, 5,000 pounds per square inch for wrought iron, and the stress on ordinary cast steel rudders should not exceed 10,000 pounds per square inch.

For small, high-speed vessels, such as torpedo boats, fast yachts, etc., a larger value of f_s may be used, say 10,000 for steel and 8,000 for wrought iron, owing to the fact that while the stock is calculated for the rudder at maximum angle and maximum speed, such a condition would never be realized except in smooth water.

Taking f_s at 7,500 pounds per square inch,

$$D = 0.088 \sqrt[3]{M},$$

and at 5,000 pounds per square inch

$$D = 0.1 \sqrt[3]{M}.$$

In the case of a rudder supported only by the stock, *i. e.*, the head fixed and supported at the bottom, the rudder stock should be calculated to resist the combined bending and twisting moments. Assuming that the pressure on the rudder is uniform per unit of depth, it may be shown that the bending moment at the rudder head is

$$\frac{PD}{8},$$

where P is the total pressure on the rudder and D is the depth. The equivalent twisting moment which would produce the same intensity of shear stress as the combined bending and twisting is

$$M + \sqrt{M^2 + T^2}$$

where M is the bending moment and T is the twisting moment.

The twisting moment at any section (A-A) of rudder main-piece is simply the sum of the twisting moments 3, 4, 5 and 6. (See Fig. 4.)

The arms supporting the single plate should be proportioned somewhat to resist the bending moment about the

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

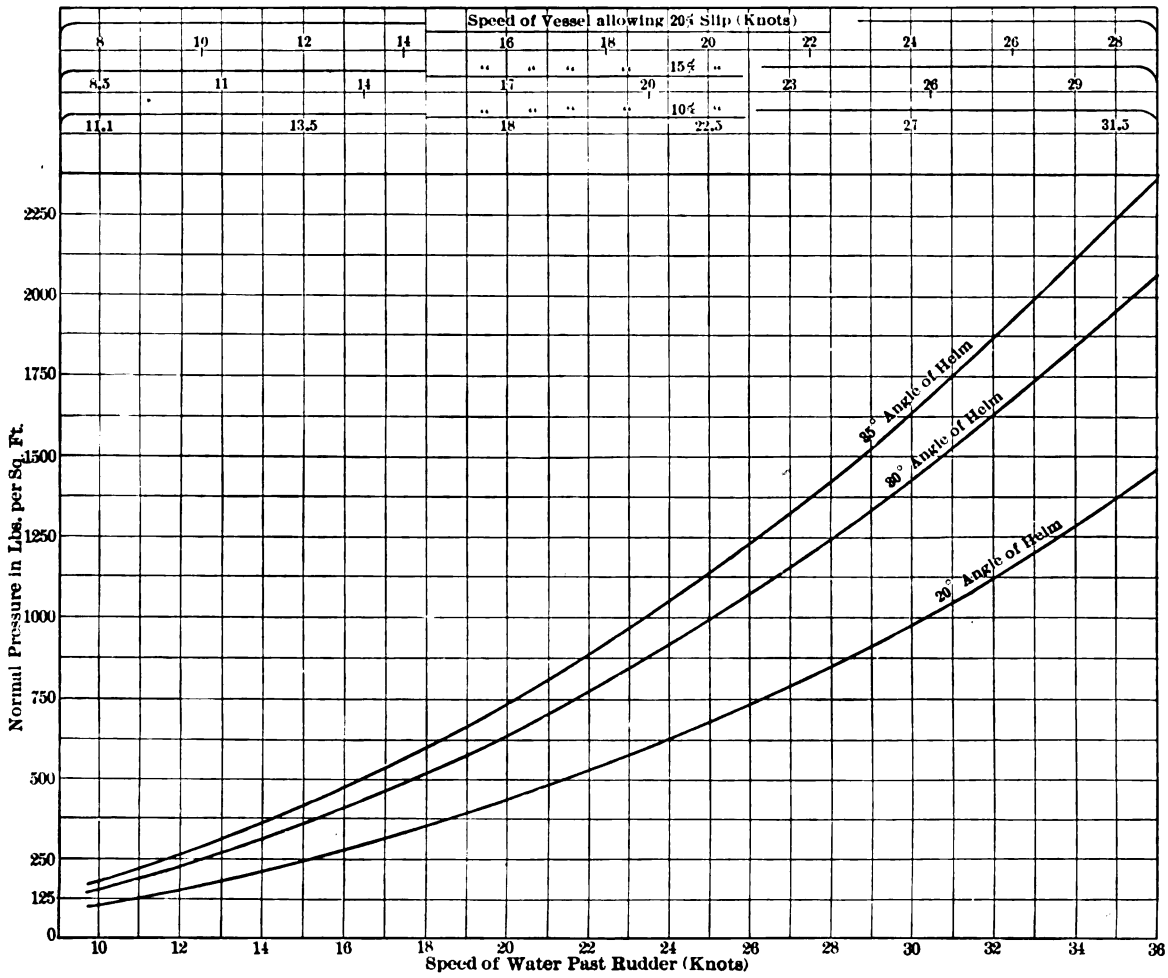


Fig. 5.—Chart Showing Pressure on Rudder at Various Speeds with Helm at Different Angles

axis of the pintles, but in all cases the dimensions should be increased to allow for shocks to which the rudder is subjected in stormy weather.

The shearing force on any pintle is the total pressure on the area supported by the corresponding arm. (See shaded portion, Fig. 4.) However, pintles when proportioned to the pressure acting on them will be amply strong to resist shear. The bearing pressure on pintles,

$$\frac{P}{D \times L},$$

where P is the total pressure acting on pintles in pounds and D and L are the diameter and length in inches, respectively, should not exceed 500 pounds per square inch where no lubrication other than water is furnished and about 800 pounds per square inch where lubricated.

The strength of the coupling joint must be equal to that of the stock. In a horizontal coupling the moment of the aggregate strength of the bolts about the rudder axis should be equal to the twisting moment of the stock.

Thickness of rudder plates range from ½ inch in small steamers to about 1¼ inches in liners. Where there is a possibility of backing into floating ice this thickness should be increased.

Various Formulae

If a ship is to be built to Lloyd's rules, rudder calculations are unnecessary, as detailed dimensions are given in their tables. In these the diameter of the stock is given for various speeds under numbers which represent the product of the total area of the rudder in square feet abaft the axis of the pintles and the distance in feet of the center of gravity of this area abaft the same axis.

Bureau Veritas' formula for diameter of rudder stocks for steamers of high speed is:

$$D = 0.18 \sqrt[3]{A B^2 V^2}$$

where

D = diameter in inches.
A = immersed depth of rudder in feet.
B = extreme breadth in feet.
V = speed in knots.

But in all cases the diameter must not be less than that given by their table.

The British Corporation formula is:

$$D = 0.26 \sqrt[3]{A r V^2},$$

where

D = diameter of stock in inches.
A = area of rudder in square feet.
r = distance from center of gravity to axis in feet.
V = speed in knots.

The German Lloyd's formula is (English measure):

$$D = 0.103 \sqrt[3]{A r V^2},$$

where r is taken in inches, other symbols being the same as for British Corporation.

Mackrow (1902) gave:

$$D = 0.392 \sqrt[3]{\frac{A U^2 d}{k}},$$

where

D = diameter of stock in inches.
A = immersed area of rudder.
U = speed in knots allowing 10 percent slip.
d = distance of center of effort from axis.

Generated on 2024-08-12 19:52 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

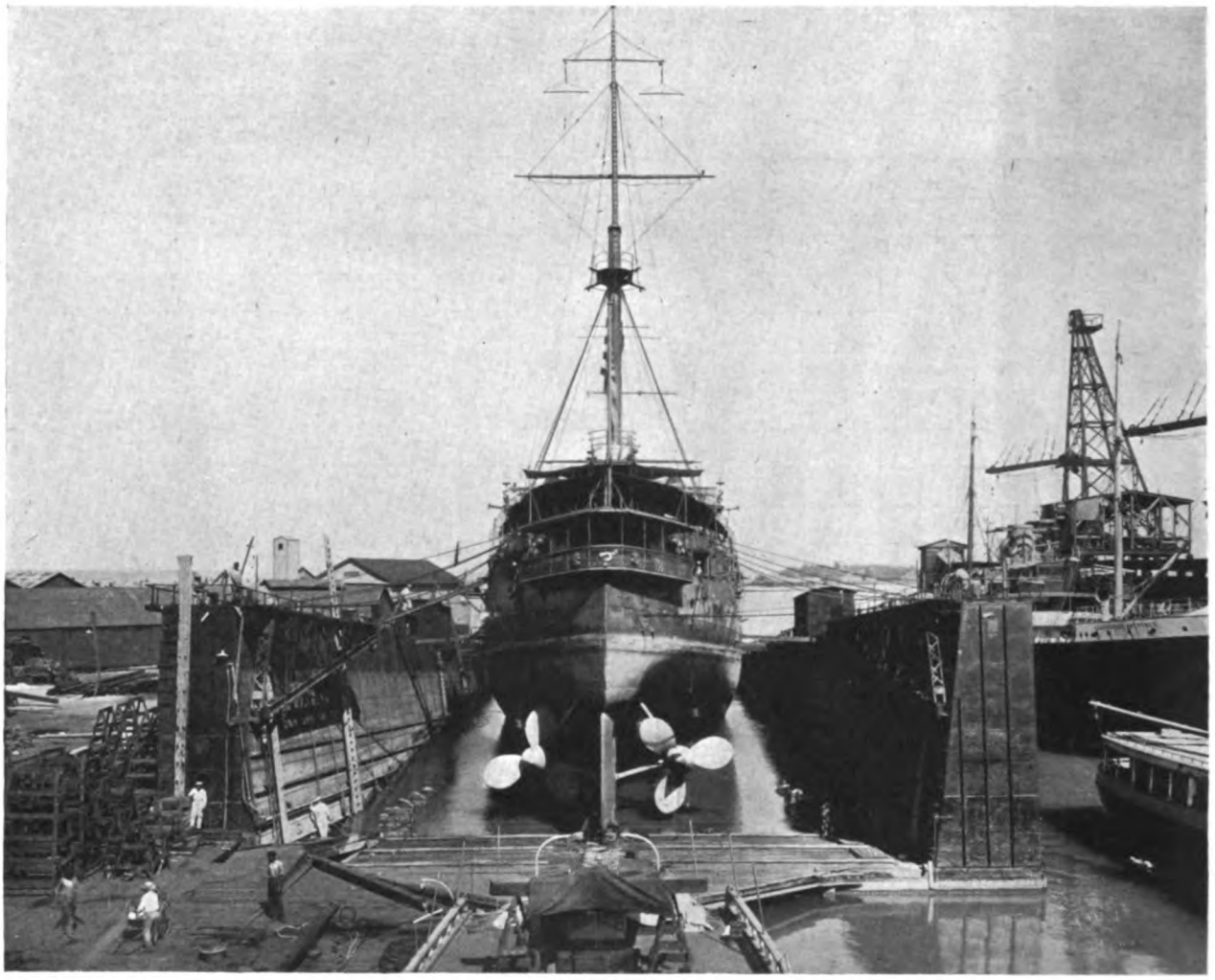


Fig. 1.—Stern View of Cruiser in Dry Dock

Extraordinary Feat of Dry Docking

Stern of 9,300-Ton Japanese Cruiser Raised Out of Water by 4,500-Ton Floating Dry Dock at Honolulu

ONE of the most remarkable feats ever known to have been accomplished with a floating dry dock was carried out recently by the Inter-Island Steam Navigation Company, Honolulu, with a floating dry dock of 4,500 tons lifting power designed and built under the supervision of William T. Donnelly, consulting engineer, New York.

The Japanese first class cruiser *Azuma,* which is a twin-screw vessel of 446 feet length overall and 430 feet length on the waterline, with a beam of 59 feet and a displacement on a draft of 25 feet of 9,300 tons, sustained damage to her propellers and it became necessary to get the propellers and shafting out of the water for repairs and replacement. The only dry dock available was the floating dry dock at Honolulu, which had a lifting power of only 4,500 tons and a length of 300 feet, as compared with 9,300 tons displacement and 446 feet length of the cruiser.

As it was impossible to place the entire vessel in dry dock, the dock was submerged and placed under the stern of the vessel, and then pumped out, with the result shown in Fig. 2, where it will be noted that one end of the dock is at its maximum submergence, while the other end of the dock has lifted the rudder and propellers of the vessel entirely out of the water. Fig. 1 shows a stern view of the vessel held in the dock with the propellers out of the water.

So far as known, this is the first time that such an extraordinary feat of dry docking with a floating dry dock has ever been undertaken, and its successful accomplishment is eloquent testimony to the enterprise and ingenuity of the engineers who carried it out, as well as of the utility of this type of dock for emergency work.

The Honolulu dry dock, which was used for this work, was described in detail in our issue for July, 1914. The dock has steel wings, 300 feet long, and eight wooden pontoons, making the length overall 352 feet. The dock has a width overall of 100 feet and a clear width between the wings of 80 feet. It is designed to take a draft of 20 feet over 4-foot keel blocks. The pumping machinery is operated by electricity and comprises eighteen 10-inch centrifugal pumps, one in each end of each pontoon. A 200 horsepower motor drives the groups of nine pumps on each side of the dock.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

EXTRAORDINARY FEAT OF DRY DOCKING AT HONOLULU

Performed by Donnelly Floating Dry Dock of Inter-Island Steam Navigation Company

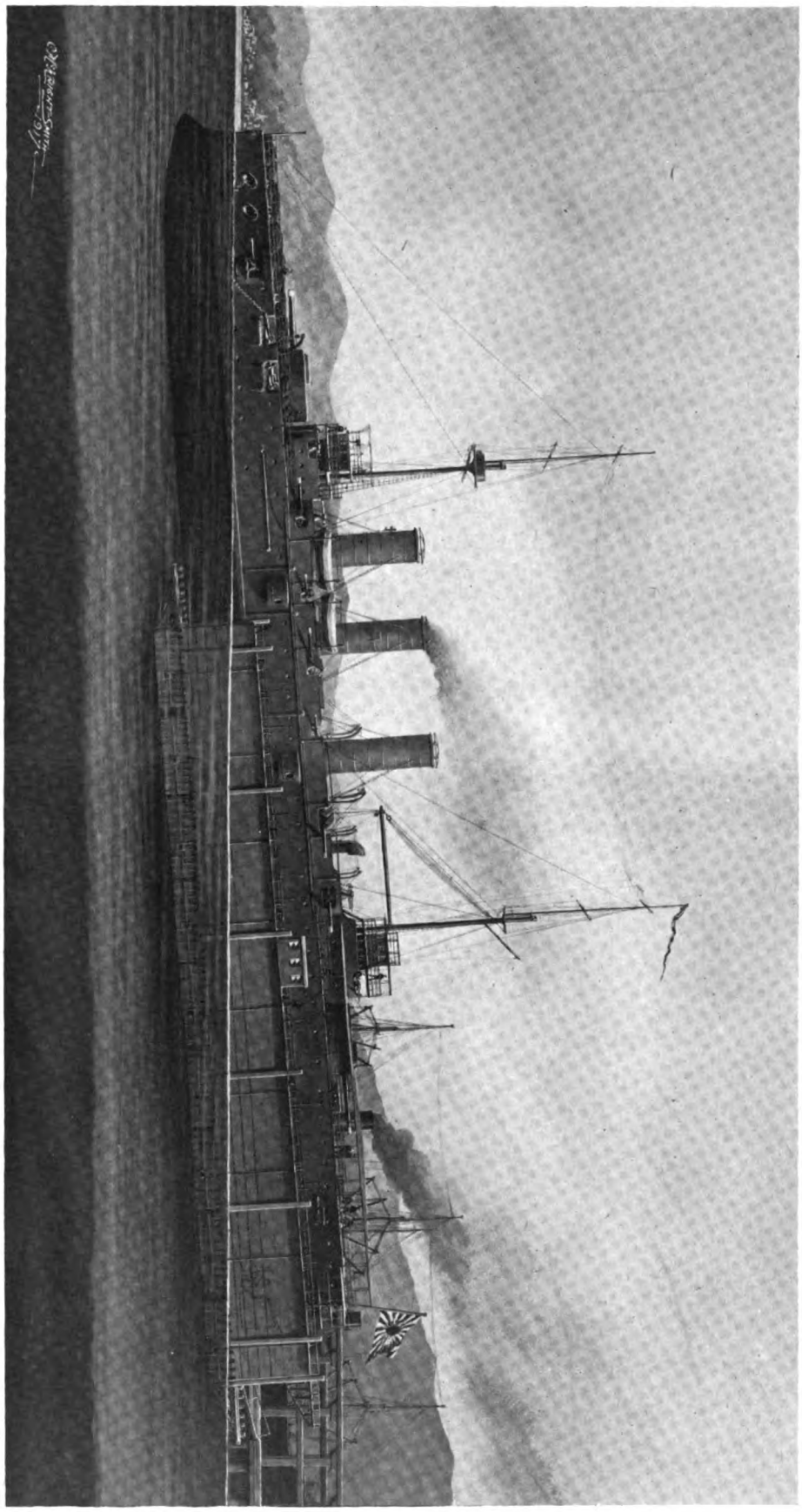


Fig. 2.—Floatation of Cruiser and Dry Dock with Vessel's Stern Lifted Out of Water for Repairs to Propellers

Generated on 2024-08-12 19:55 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Shipbuilding Accidents*

(Concluded from July issue.)

Accidents from falling objects are of frequent occurrence in shipbuilding. Planks, bolts, hammers, wrenches, driftpins and various other tools and materials are often displaced or accidentally dropped by workmen, and the vibration resulting from the hammering and riveting also contributes to the general downfall, to the constant peril of workmen stationed below. Accidents of this nature can be greatly reduced by strapping or bolting the platform planks of the staging, as already recommended, and by providing all staging platforms and all shelves and other storage places with effective toe-boards or side-boards. Substantial overhead shields should be erected for the protection of all men who are stationed where they might be injured by the fall of objects from work-places at a higher level, and like protection should be erected over all passageways or gangways where a similar hazard exists. The spaces between the staging platforms and the hull of the ship should also be bridged over, as far as practicable, with wire mesh guards supported on pins thrust through holes in the bearer-bars of the staging, or in some other effective way. These can be made in sections, and used over and over.

The main gangways or runways, leading from the ground to the interior of the ship or to the staging platforms, should be well constructed and of ample proportions. They should be properly railed and provided with suitable landings at the top. Whenever there is any likelihood of material falling from them, they should also have toe-boards at both edges. A ramp or runway having a gradual rise, and provided with substantial hand rails on each side and with cleats to prevent slipping, increases the efficiency and the safety of the men. It seems hardly necessary to point out the importance of promptly removing ice and snow from all runways and platforms, and from all parts of the ship. Further protection should be provided by the liberal application of sand or ashes.

When the staging is dismantled, the various parts of it should be lowered to the ground by means of ropes, instead of being thrown down. If the material is thrown down there is always the chance of some one inadvertently getting in the way of a falling plank, or some one at a supposedly safe distance being hit by pieces that take unusual rebounds. With careful lowering, the timber is also far less likely to be broken or otherwise damaged.

Repair Yard Hazards

Some shipyards do overhauling and repairing, as well as new work, and although the hazards in yards of this kind are similar, in the main, to those that exist in yards that do construction work only there may be certain minor differences. A ship is not earning dividends while she is in the repair dock, and for that reason her owners usually insist that she be placed in commission again at the earliest date possible. This means that the repair men must plan in every way to save time, and a limitation of this kind often introduces new dangers. For example, painting the interior of the ship with standard oil-mixed paints necessitates considerable delay for drying, both between coats and after the finish has been applied, and in order to eliminate this delay it is customary to use quick-drying paints, containing highly inflammable substances, such as benzine, benzol or alcohol. Paints of this nature hasten the work, without doubt, but the use of them is attended by the risk of explosions and fires, and they may also produce injurious effects on the workmen. When paints containing volatile constituents that are inflammable or toxic are used in confined places, no open lights should be permitted, and smoking or the use of matches for any purpose whatever should never be allowed, on pain of immediate dismissal. The men should also have frequent periods of rest in the open air, and foremen should inspect all confined work places at least once every half hour while the work is going on. Good ventilation is highly important wherever paints such as we have described are being used, and if the quarters in which the men have to work cannot be ventilated easily and effectively by natural draft or by fans, a plentiful supply of fresh air should be introduced by means of a centrifugal pump and one or more lines of large canvas hose. The air should be delivered, in such cases, at the innermost part of the space, so that the objectionable vapors will be removed as thoroughly as possible. If the work is being done in a pit-like or well-like space, each workman should wear a belt with a stout life-line running up to the entrance to the work place, and *two* men should be stationed above, to draw the workmen up to safety in case they become overpowered, or show signs of drowsiness or of unnatural exhilaration. In some cases it will also be advisable to provide the workmen with special respirators, supplied with fresh air by a pump.

First-Aid Room

In view of the large number of minor injuries about a shipbuilding plant, it is highly important to provide a first-aid room, or a hospital. Bruises, slivers and cuts are not necessarily dangerous if they receive proper attention at once, but the average man will seldom quit work in order to attend to a slight injury, unless he can be treated immediately, so that he can return to his work without much delay. Even though he knows of hundreds of cases of blood poisoning due to the neglect of seemingly insignificant wounds, he will "take a chance" rather than go to his home or to the office of his family physician, for the treatment of a minor injury; but he can have no logical objection to receiving proper treatment by a competent person at the yard. The facilities at hand should be sufficient to render first-aid in the case of serious injuries also, because proper treatment of this kind has a large influence on the ultimate recovery of a badly injured man. It is important, however, to see that all first-aid work is done by a fully qualified person. Otherwise a great deal of harm may result.

In the shipbuilding industry there are a quite a number of cases of lead poisoning every year. The exposure is usually incurred while sandpapering painted surfaces or removing old lead waste (sometimes in confined spaces such as tanks, or between double bottoms or in bilges), or from breathing the fumes that are produced when red-hot rivets are placed in holes lined with red lead. Exhaust ventilating systems and a sparing use of lead paints tend to reduce this hazard.

Educational Safety Work

Educational safety work is specially important in the shipbuilding industry, which is admittedly a dangerous one. Moreover, the operations that must be performed are of such a nature that it is hard to provide mechanical safeguards that will afford a protection comparable with that which may be had in many other similarly hazardous employments. Here it is doubly important to study and promote safe methods of doing the work, and to instill the principle of personal caution into every employee about the yard. If the men can be brought to look at the safety question from the right point of view, and good "team work" can be secured, the accident rate will certainly fall off to a remarkable extent.

* From *The Travelers Standard.*

Generated on 2024-08-12 19:28 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Company of Cadets on Camp Dewey Drill Ground

Young America Doing Its Bit

United States Junior Naval Reserve Training Hundreds of American Boys for Future Service at Sea

CAMP DEWEY, the big summer training camp of the United States Junior Naval Reserve, closed on September 1, after having been open from June 1, with an enrollment of over 600 cadets from all parts of the United States.

The United States Junior Naval Reserve was created to stimulate the interest of Americans in their navy and merchant marine by developing the sense of civic responsibility of the boys and young men of the country and then to fit them to fulfill any duty in life which may be imposed upon them. The method adopted provides for instruction and drills for boy cadets between the ages of 10 and 20; summer training camps for those between the ages of 14 and 20 and nautical schools and training ships for those young men who wish to enter the merchant marine as officers or adopt the sea as a career.

Camp Dewey is located in Uncasville, Conn., on the west bank of the Thames river, about five miles up from New London. It is ideally situated for a naval camp and a summer training school. On a high wooded plateau overlooking the river, with a splendid drill ground, a convenient dock and a new mess hall seating a thousand boys, the United States Junior Naval Reserve furnishes a summer camp that is splendidly adapted for the purpose of training boys of from 14 to 18 years of age for the navy or merchant marine.

There was not a boy who attended Camp Dewey for the weeks of summer training, but who returned tanned and rugged, fit and ready with head and hands, and with a new background of practical knowledge of land and water drill-work that will prove of value to him and to Uncle Sam in time of need.

The splendid work being done by the United States Junior Naval Reserve has received much commendation by statesmen, naval men and financiers who have visited the camps of the Reserve and have seen the results of the training in the well-drilled and capable cadets. Many prominent men interested in the extension of our navy and the creation of a greater merchant marine were at Camp Dewey during the summer, addressing the boys and reviewing the battalion during their stay by the Thames.

From their National Headquarters at 218 West Fifty-eighth street, New York, the Reserve is preparing now for the opening of their new winter base, Camp Josephus Daniels, at Palm Beach, Fla. At this camp work will be carried on up to May 15, when Camp Dewey will again be opened, and the banks of the Thames will again echo with bugle calls, young voices and marching feet.

Young America is doing its bit!

SWEDEN TO CONSERVE LIQUID FUEL SUPPLIES.—A royal decree has been issued in order to conserve Sweden's supply of liquid fuel and enforce economy in its use. According to this decree, permission must be secured from the Industrial Commission for the use of liquid fuel by motor boats or other vessels.

Camp Dewey Boys

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

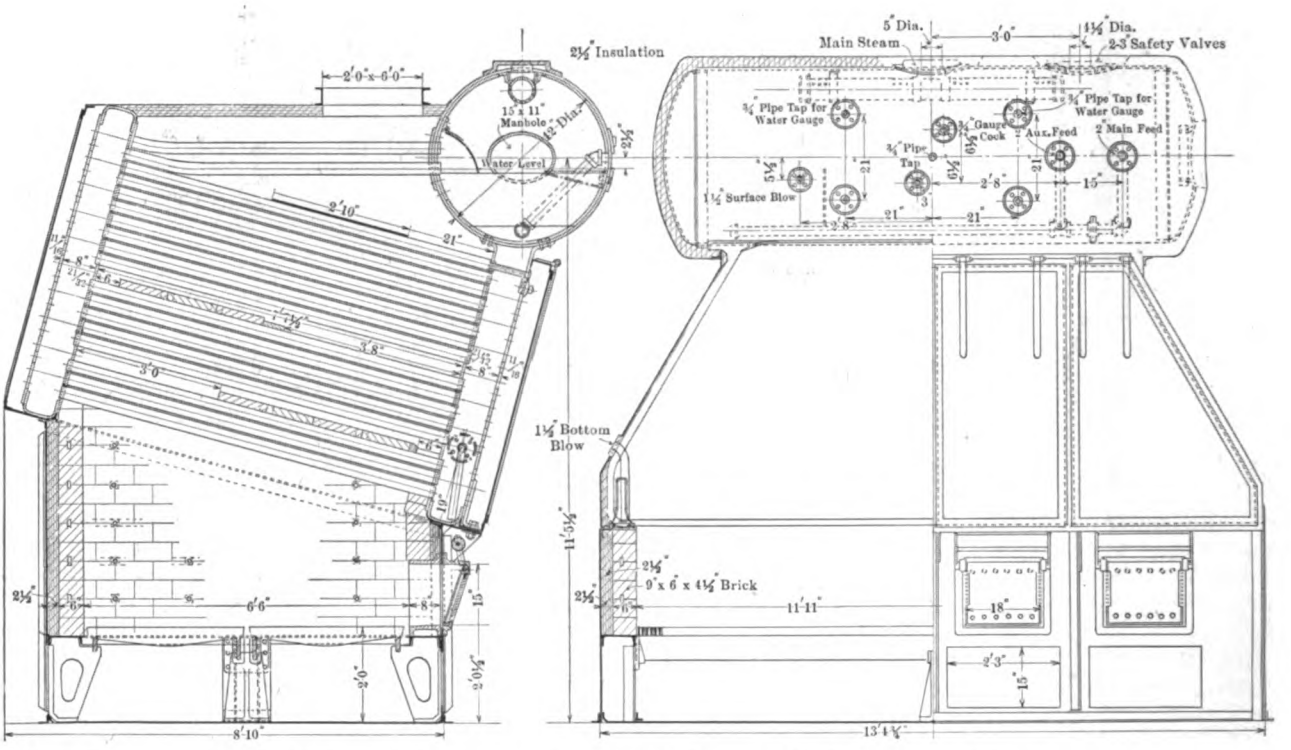


Fig. 1.—General Arrangement of Standard Boilers for Wooden Emergency Fleet

Standard Watertube Boilers for United States Emergency Wooden Steamships

Cross Drum, Straight Tube Type Watertube Boiler Designed by United States Shipping Board Emergency Fleet Corporation

Boilers for the standard wooden steamships of 3,500 tons deadweight carrying capacity which are being built for the United States emergency fleet will be of the marine watertube cross-drum type, with straight tubes expanded into continuous stayed steel plate headers.

The boiler has been designed by the United States Shipping Board Emergency Fleet Corporation, which has charge of the building of the ships for the Shipping Board, with a view of providing a simplified type of boiler composed of small parts which can be manufactured in large quantities with the utmost rapidity by practically any boiler shop in the country, wherever it may be located. The urgent need of getting the greatest possible number of cargo vessels into commission as quickly as possible to offset the destruction of merchant ships by German submarines, made imperative the adoption of a type of boiler that can be constructed by any boiler shop with its ordinary facilities and without the necessity of providing special machinery or equipment. It was necessary, also, that the boiler be of such type that it could readily be dismantled after construction and shipped from points inland to the seaboard.

As stated above, the boiler is of the cross-drum type with straight tubes expanded into continuous stayed steel plate headers. The height to the center of the steam drum is 11 feet 5½ inches; the width of the furnace front 13 feet 4¾ inches, and the depth from the furnace front to the back of casing 8 feet 10 inches. The grates are 6 feet 6 inches long by 11 feet 11 inches wide, giving a grate area of 77.45 square feet. The total heating surface is 2,544 square feet, making a ratio of heating surface to grate area of 33 to 1.

The heating surface is distributed as follows: tubes, 2,452 square feet; front header, 33 square feet; back header, 38 square feet; drum, 21 square feet. The tubes, of which there are 414 in all, are hot rolled, seamless steel, 3 inches outside diameter, of No. 11 B. W. G., except the three bottom rows, which are No. 10 B. W. G. All of the tubes are straight except the two top rows, which are bent to a 36-inch radius near the back header.

The steam drum is 42 inches inside diameter with bumped heads, one of which is solid, ⅝ inch thick, and the other 11/16 inch thick with a 11- by 15-inch manhole. The back header is stayed with 1¾-inch hollow staybolts and the front header with 1½-inch solid staybolts.

The boiler is designed for a working pressure of 200 pounds gage, and a hydrostatic pressure of 400 pounds

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

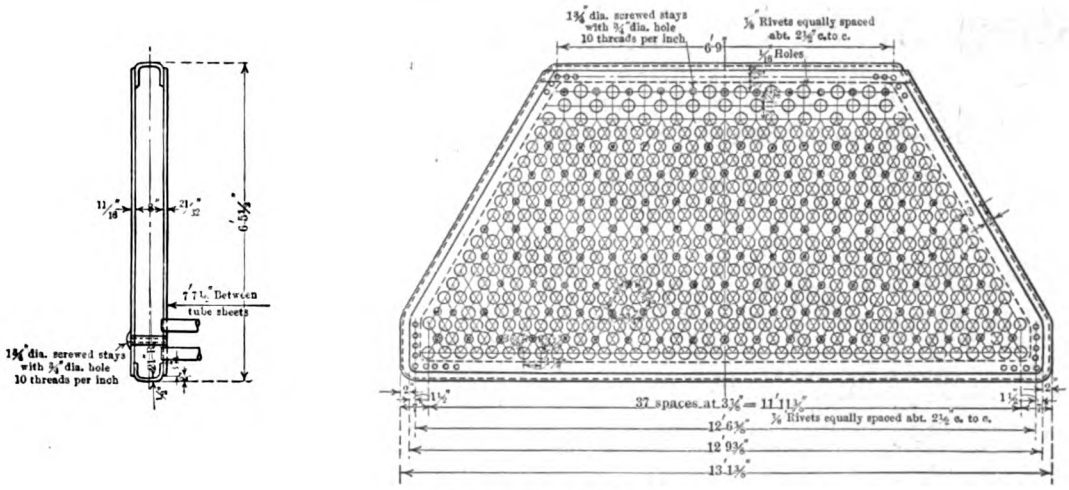

1¾" dia. screwed stays with ¾" dia. hole 10 threads per inch
⅜" Rivets equally spaced abt. 2⅛" c. to c.
6'9"
⅝" Holes
7'7½" Between tube sheets
37 spaces at 3⅜" = 11'11⅛"
⅜" Rivets equally spaced abt. 2½" c. to c.
12'6⅜"
12'9⅜"
13'1⅜"

Fig. 2.—Back Header

gage. It will be fitted with a system of forced draft and is designed to evaporate 15,000 pounds of water per hour, with feed water at 200 degrees F. when burning about 20 pounds of anthracite coal per square foot of grate. The specifications embody the latest rules and regulations of the United States Steamboat Inspection Service applying to marine watertube boilers for ocean and coastwise trade, and the design has been approved by the Board of Supervising Inspectors and by the American Bureau of Shipping. No punching will be allowed on inside plates. All drilling and reaming for rivet holes shall be done from the outside after the plates are assembled. The use of drift pins will not be allowed. "Bulled" rivets are specified where possible, and they must be driven at a cherry red heat and held in the riveting machine at least thirty seconds.

The furnace is constructed of steel plates and angles designed to be readily dismantled for shipment. The firebox and casing part along a plane parallel to the inclination of the tubes and are so formed as to provide a support for the lower part of the front and back headers, as shown on the drawings.

The furnace is lined with special firebricks 9 by 6 by 4½ inches, having continuous grooves on one end to receive ⅝-inch square head bolts for fastening to the casing. These grooves are to be completely filled with high pressure cement and a thin coating of the same cement will be interposed between butts and successive layers of firebricks.

The ashpan is built up of steel plates made in sections for easy removal. The edges of the plates are flanged for bolting together.

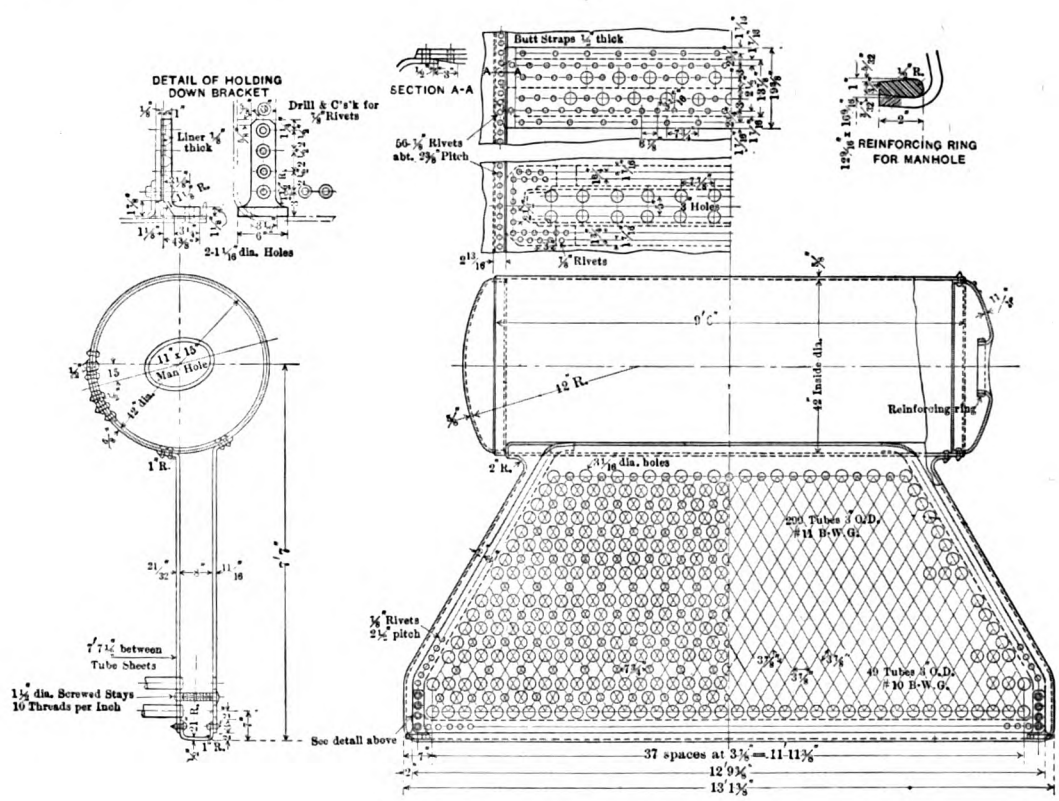


Fig. 3.—Drum and Front Header

Generated on 2024-08-12 19:56 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Closing of Side Apertures From the Bridge*

Description of Device for Increasing Safety of Passenger Vessels by Simultaneous Closing of All Openings to Watertight Compartments

BY ING. E. BENVENUTI

ONE of the main principles formulated by the International Convention of London in regard to the design of ships was that the maximum length of each transverse watertight compartment must be proportional to the length of that portion of the hull having its center at the middle point of the compartment, which may be open to the sea without sinking the ship beyond a certain margin line. In this connection it should be remembered, however, that the ratio between the spacing of transverse watertight bulkheads and the floodable length has for many years been taken into account in the design of passenger steamers, particularly in the design of oceangoing liners, owned by large steamship companies. In this class of vessel it has been usual for the leading steamship companies to require, either from their own naval architect or from shipbuilders, that new ships should still retain a stipulated freeboard should one or more adjacent transverse watertight compartments become flooded.

It may also be added that the stipulations in regard to floatability and freeboard in damaged conditions, made by the steamship companies, for transoceanic passenger liners are, as a rule, much more rigorous than those fixed by the International Convention. For example, for a ship primarily engaged in carrying passengers and having a length at the load waterline equal to, say, 600 feet, the Conference Regulations state, under Article 8, that the maximum length of the transverse watertight compartments must not be more than 0.422 of the floodable length of the ship. That is to say, the ship, under the practical conditions of permeability of the various compartments assumed by the Convention, must be able to remain afloat when two of her compartments are open to the sea and the two compartments adjacent to these are filled with a quantity of water about four-tenths of their total capacity, taking into account their permeability.

In comparison with the above requirements it may be pointed out that there are already existing ships having the load waterline length referred to, which will be able to remain afloat with three transverse watertight compartments open to the sea, and there are under construction for the Navigazione Generale Italiana ships of this length which will be able to remain afloat with four transverse watertight compartments open to the sea. These ships, designed before the report of the International Convention was published, show that the leading steamship companies, fully realizing the moral responsibility undertaken by the owners of passenger ships, have not only freely adopted for several years past one of the main principles stated by the Convention, but have adopted that principle in a much more rigorous manner than was prescribed by the Convention.

The actual design and construction of the new vessels building for the Navigazione Generale Italiana, the dimensions of which will probably be those of many passenger ships in the near future, also demonstrate that it is possible for the naval architect to design a ship which will comply with all the requirements of the steamship companies in regard to passenger accommodation and suitability for a particular trade, and also present a degree of safety in damaged conditions far greater than that demanded by the International Convention. It is sufficient for this purpose to adopt a sufficiently high ratio between the molded depth to the bulkhead deck and the fully loaded draft, as the calculations in regard to transverse stability under different conditions of lading show that, with the usual values of the breath adopted in vessels of this type, there may be, corresponding to some initial conditions of the ship when undamaged, a sensible list at the beginning of the flooding, but that the ship will have sufficient transverse stability when the compartments are flooded to sea-level.

But it is most important to note that the above conclusions on the safety of ships in damaged condition depend largely upon the supposition that, whatever be the damage sustained by the hull, water cannot enter into any other watertight compartments than those aggregating the floodable length of the vessel corresponding to the damaged part of the hull. This is, for a passenger ship, a supposition which is capable of realization only under exceptional conditions, as hygienic necessities of comfort have turned the sides of every large modern liner into veritable sieves, owing to the hundreds of apertures made through the skin below the bulkhead deck.

Generally speaking, these apertures are of two kinds—overboard discharges and light and air apertures; but they all provide likely means of ingress for water to the inside of the ship in the event of an accidental increase beyond the load draft of the ship.

The first and most important effect of the flooding of any portion of the vessel is to increase the draft of the ship; either uniformly or with a change of trim depending upon the location of the damage. In either case an important fact arises in regard to the undamaged compartments of the ship, viz., the inner apertures of the overboard discharge pipes as well as the sidelights, which before the damage occurred were above the waterline, become in many cases submerged. The time required for such a sinkage, as well as the length of the portion of the hull for which the sidelights and the apertures of the discharge pipes become submerged, depend upon many circumstances differing for each special case.

Referring to the first point, experience has shown how, in many cases of extensive damage, particularly owing to the unavoidable list of the ship when flooding, only a few minutes elapse between the time of the damage and the submersion of the apertures. Referring to the second point, I think it interesting to give in Table A the results of calculations relating to the various trims of a ship having a watertight subdivision suitable for assuring her floatability with four adjacent transverse watertight compartments freely open to the sea in the case of a ship having the following principal dimensions:

	Feet	Inches
Length between perpendiculars	601	0
Breadth molded over frames	76	0
Molded depth to bulkhead deck	50	2
Load draft	28	0
Sheer at bulkhead deck forward	12	3

* Paper read at the Spring Meetings of the Fifty-eighth Sessions of the Institution of Naval Architects, London, March 28, 1917.

Generated on 2024-08-12 19:30 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Sheer at bulkhead deck aft.....	4	10
Minimum height above L.W.L. of the sill of sidelights in the first 'tween deck.....	19	0
Ditto for the sidelights of the second 'tween-deck	10	6

The sidelights of the third 'tween deck being supposed to be kept permanently closed at sea have not been taken into account, and the vessel was supposed not to list over more than 10 degrees.

The results given refer to the various possible groups of four adjacent transverse compartments flooded, and they undoubtedly deserve the closest attention because they give an exact idea of the real conditions of safety of the ship in damaged condition. They clearly show how, in consequence of the flooding of a portion of the vessel, there are from *four* to *ten* undamaged watertight compartments, the sidelights of which become submerged, and these consequently may be, either entirely or partly, invaded by water passing through some open sidelights.

The calculations dealt with relate to a vessel of a special design with exceptional watertight subdivision, large sheer and a very considerable height above the line of the lowest row of sidelights which may be open to the sea, so that we must conclude that the real safety conditions of nearly all the vessels now afloat or building, should damage occur to their hull, will prove inferior to the case referred to. The above conditions would appear yet worse if we consider the possibility of some undamaged compartments being flooded through overboard discharge pipes, because the apertures of these pipes inside the vessel are not, as a rule, more than two or three feet above the deck. The striking results of the calculations lead, therefore, to the conclusion that in all probability if damage were sustained which opened to the sea a group of compartments not totaling the floodable length of the ship, this would cause her loss if all side apertures were not, at the moment of the damage, either already closed or immediately closed.

Both the International Conference, which met in London in November, 1913, and the Bulkhead Committee appointed by the Board of Trade, took into consideration the influence of the side apertures of a vessel upon her practical safety in damaged conditions. Article 23 of the Convention states that as a general rule all sidelights and overboard discharge openings must be fitted with suitable means for closing them, and must also be arranged in such a manner as to prevent, as far as possible, the accidental admission of water into the ship. With special reference to sidelights, Article 16 of the Regulations annexed to the Convention states the sidelights below a deck, the under side of which at its lowest point (at side) is less than 7 feet above waterline, must be kept permanently closed at sea. The article also forbids the fitting of sidelights in spaces exclusively devoted to the carriage of cargo or coal.

With reference to the overboard discharge apertures, the aforesaid article, besides requiring the largest possible grouping of the discharge pipes, also requires that discharges led through the skin from spaces below the margin line shall be fitted either with one valve that can be worked from a distance or with two valves, one of these being always accessible.

These requirements aim at increasing the limit of sinkage and inclination of the vessel at which water would eventually enter the undamaged compartments through open sidelights or discharge pipes, and also tend to increase the possibility of a closure of all sidelights and discharge openings, when the ship suddenly and greatly increases her draft by listing over or changing trim, thus making it difficult for the crew to reach the compartments below the weather deck.

In modern transatlantic liners the machinery, the bunkers, and the numerous passenger and deck services require a very large amount of space on board such ships, and consequently, in order to ensure a profitable working of the vessel, it is necessary to fit passenger accommodation also in the lowest 'tween decks. Fast liners having passenger and crew accommodation distributed in three 'tween decks below the upper deck are very usual, and will undoubtedly be more usual in the near future. Increasing demands for comfort will, moreover, necessitate in new passenger ships that sidelights of the lowest accommodation should be allowed to be kept open in fine weather at sea. That is to say, liners of the future will have three rows of open sidelights below the upper deck, which deck will also very often be the bulkhead deck, in order to avoid an excessive transverse subdivision of the hull. Further, the height of the lowest row of sidelights will often be small, corresponding to a height of the lowest point at the side of the second deck below the upper deck equal to 7 feet above the waterline.

Of course, in the above conditions, the immediate closure of the sidelights on the spot by hand will prove practically impossible, as many cabins are kept locked at sea, while other spaces on board are used as stores.

With regard to sidelights, we are consequently led to conclude that a modern passenger liner will in practice only realize the degree of safety at sea in damaged conditions for which she was designed, provided:

(*a*) Either all the sidelights fitted below the bulkhead deck are permanently closed at sea;

(*b*) Or a suitable and reliable arrangement for controlling all sidelights from the bridge or other central station is fitted on board.

If one of the above conditions is not fulfilled the degree of safety in damaged conditions of the ship, arrived at from her flooding calculations, will only have a theoretical value.

It is well known, however, that in the practical working of a passenger ship the first condition cannot be fulfilled, no matter what the climate is in which the vessel trades or the ventilating system installed on board. Passengers, and particularly cabin passengers, expect to be allowed to open the sidelights of their rooms, and very often refuse cabins having fixed sidelights or, at any rate, are only prepared to pay a low price for such rooms. It is therefore necessary to fulfil the second condition, and this would doubtless have been stipulated by the Convention or by the Bulkhead Committee had a suitable controlling arrangement been already devised at that time.

With reference to the overboard discharges, although these have a much smaller diameter than sidelights, and are fitted with storm valves, and are always connected to inside pipes of small diameter, the question of the reduction of their number as well as that of closing them in any emergency at sea is a very important one. A radical method for reducing to a minimum the number of the skin apertures is one, also given in the first report of the Bulkhead Committee, which consists in fitting in each watertight compartment, or in each group of watertight compartments, a drainage system having a collecting tank and suitable pumping arrangements. But the fitting of such an arrangement involves the addition of other mechanisms to the already numerous devices existing on board modern large passenger ships, and as it is not desirable to carry large pipes through the transverse watertight bulkheads, the arrangement proves very complicated and costly, and also requires two apertures in the skin of each of several compartments, because of the convenience of draining into separate collecting pipes and tanks, the

Generated on 2024-08-12 19:16 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

baths and washbasins, and the nests of water closets, even though use may be made of syphons on the separate discharges.

In my opinion, for nearly all passenger ships it is possible without having recourse to such a complicated plant, to make a sufficient reduction in the number of the overboard discharge openings by the following arrangement:

(*a*) Lead all water discharges from the deck below the bulkhead deck to the bilges of the corresponding watertight compartments;

(*b*) Group all the soil pipes from the nests of the water closets fitted in each watertight compartment into one overboard discharge;

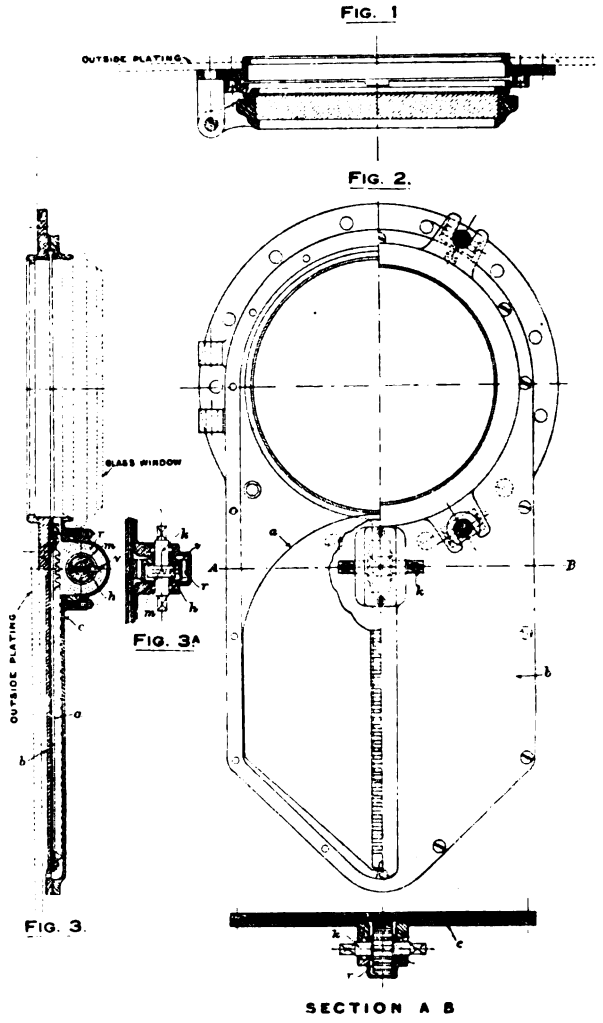
(*c*) Fit in each transverse watertight compartment two inclined collecting overboard discharge pipes in the 'tween deck immediately above the waterline, one on each side on the face of the reverse frames, into which all scuppers and water discharges must drain from the bulkhead deck and the decks above in way of the compartment. Into these collecting pipes the soil pipes of the private water closets may also discharge provided the number of the latter be not too great. Of course, in these collectors there must be a continuous circulation of salt water from the sanitary service.

With the arrangement just described the overboard discharge apertures will generally be reduced to two for each watertight compartment, and only in the compartments in which nests of water closets are fitted will there be three or, very seldom, four skin apertures required for discharges. By fitting to each aperture a skin sluice valve, the plant will prove as suitable and practical as that requiring special pumping arrangements, while certainly simpler and more economical in first cost and upkeep. With reference to the possibility of closing the overboard discharge openings in an emergency, it may be a matter for discussion whether the fitting to each aperture of a skin sluice valve worked from a deck above the bulkhead deck, in addition to the usual storm valve, represents the best device for the safe closing of these openings. But I must say, having designed such an arrangement for large liners now building, the result proved so complicated and costly in regard to the control rods and gears for the sluice valves that I do not recommend the installation of such a system. Another and greater disadvantage of such an arrangement is that in an emergency at sea a great deal of time and a number of persons will be required for the closing of all sluice valves owing to the unavoidable distribution of the control wheels throughout the full length of the ship, often in places not always easily and rapidly accessible to the crew.

Consequently we must conclude, as in the case of the sidelights, that it is necessary to have a suitable and reliable arrangement for the simultaneous closing from the bridge of all valves fitted on the overboard discharges, in order to ensure that the presence of the latter will not diminish the degree of safety in damaged conditions to the ship by her watertight subdivision.

The arrangement here described for the simultaneous closing from the bridge of all sidelights and overboard discharge apertures presupposes that the ship is fitted with the usual hydraulic plant for controlling the watertight doors from the bridge, as such a plant must now necessarily be provided in a modern liner owing to the requirements of the International Convention and the recommendations of the Bulkhead Committee in regard to the closing of the watertight doors. If such a plant is not available, a special small hydraulic plant would require to be added.

The principal features of the proposed arrangement are:



Figs. 1-3

(*a*) The fitting to each sidelight or skin aperture of a sliding shutter;

(*b*) The fitting, corresponding to each transverse watertight compartment, of a mechanism for closing the shutters, these mechanisms being identical in design for all compartments, but quite independent of one another in regard to their working.

The proposed type of sidelight is shown in Figs. 1, 2 and 3, and is fitted with a sliding shutter (*a*) made in gunmetal. The shutter, sliding in a vertical direction, closes the sidelight opening outside the glass, the closing being practically watertight, and it also protects the glass against breakage by objects floating near the ship. The illustrations show how the hinged part of the sidelight remains as usual and may also be fitted with a deadlight. The fixed part of the sidelight, however, is different from the usual practice and had an appendage (*b*), which forms a case for the shutter when the latter does not close the sidelight opening. The shutter is worked by a rack and pinion gear, the rack being riveted to the shutter, while the bearings of the axis of the pinion (*r*) are cast solid with the cover (*c*) of the case. The ratio between the diameter of the pinion and the stroke of the shutter is identical for all the sidelights in the ship, so that the closing of the latter requires an equal number of revolutions for all the pinions, actually about one and one-half or two revolutions.

The illustrations clearly show how the sliding of the shutter is quite independent of the opened or closed position of the hinged part of the sidelight. That is to say,

Generated on 2024-08-12 19:24 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

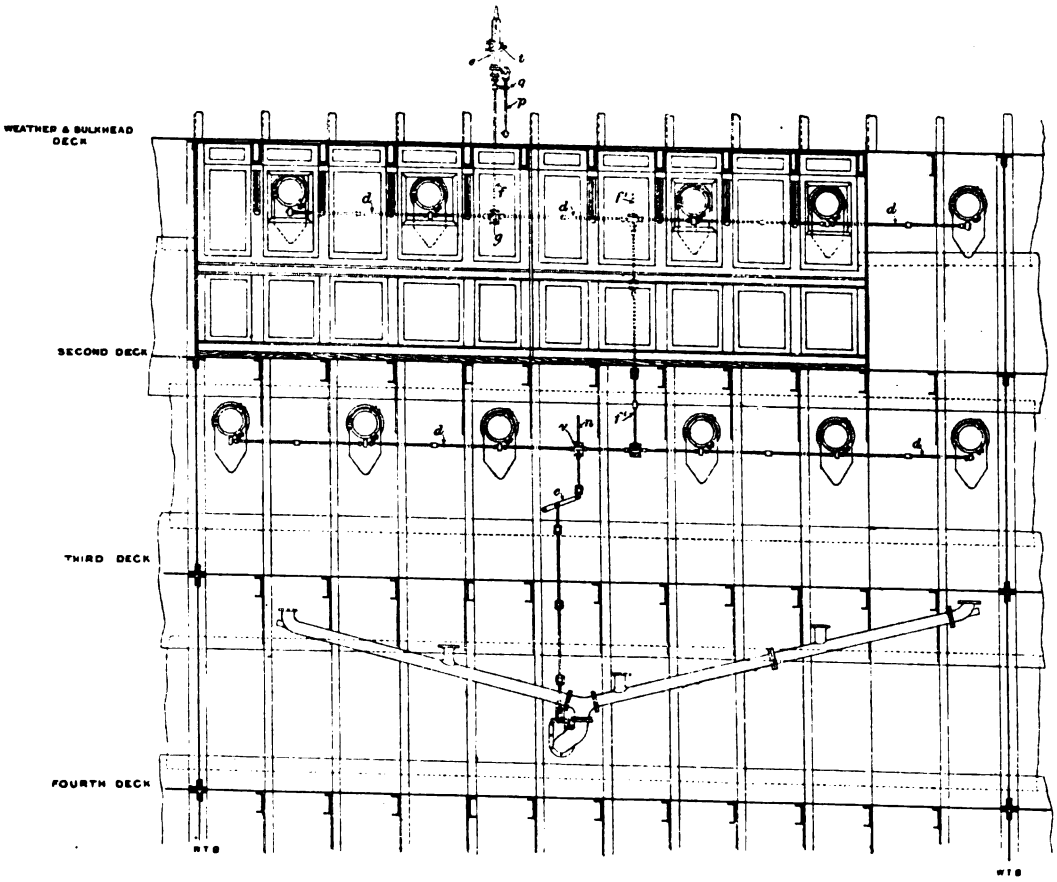


Fig. 4

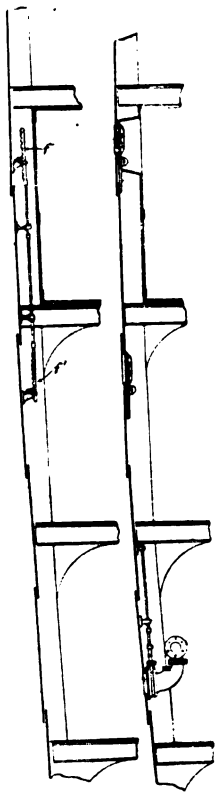


Fig. 5

the shutter only represents an additional closing arrangement for the sidelights, suitable for emergency use at sea, and leaves quite unaltered the usual working condition of the sidelight. The sidelights remain under the control of the passengers and crew, and it is immaterial whether, at the instant when the shutter must be closed, the glass window is open or not.

It must be noted that the proposed closing is only for emergencies; and although with careful workmanship the closing by the shutter may be made practically watertight, it must be remembered that absolute watertightness is not essential, as the proposed arrangement has for its aim, when damage to the skin occurs, to prevent, by a rapid control from the bridge, any appreciable quantity of water entering the undamaged compartments of the ship by passing through those of the sidelights which may be open at the instant of the damage and which may be situated in places not easily and rapidly approachable by the crew. As a rule, after closing the shutters from the bridge, the crew must then close by hand all glass windows and deadlights, but it is evident that the safety of the ship will not be compromised either because of time being required for that measure, or by the practical impossibility of closing some of the glass windows.

Figs. 4 and 5 show all shutters of the sidelights of one transverse watertight compartment fitted on each side of the ship may be closed simultaneously. It will be seen that the vertical spindles of the pinions working the shutters of the sidelights fitted on each side in each 'tween deck of a compartment are actuated by a horizontal shaft consisting of small horizontal rods *d* passing through the frames of the vessel. The various horizontal shafts are next connected up to a small vertical hydraulic cylinder *e* fitted against the plating, this cylinder being worked from the bridge by hydraulic power. The piston rod of each cylinder actuates a rack *f* engaging with a main pinion *g* keyed on the horizontal shaft controlling the shutter pinions of the upper 'tween deck. The two horizontal shaftings of the 'tween decks are connected by a system made of two racks *f'* and a rod between them, consequently when one shaft turns the other shaft turns also.

It will thus be readily understood that by turning a handle in the wheelhouse the pistons of the hydraulic cylinders fitted in each compartment actuate, through the racks *f* and *f'* and the main pinions *g*, the horizontal shafts for the various 'tween decks and thus close simultaneously all the sidelight shutters. By reversing from the bridge the pressure in the hydraulic system, the pistons of the small cylinders move in the opposite way and consequently open all the shutters.

To prevent failure of the system through an obstacle preventing the closing of one shutter, and in order to avoid serious injury to anyone who might have an arm or head through the light at the time of damage, each shutter is provided with a slip coupling by means of which the shutter will be thrown out of gear should the normal pressure in the hydraulic system not suffice to close it.

The details of the slip coupling referred to are shown in Figs. 3 and 3*a*. It will be seen that the portion *k* of the horizontal shaft which forms the spindle of each pinion passes freely across the latter. The spindle is provided with a collar *h*, which is arranged in a corresponding recess in the pinion. In the collar *h* is fitted a small pin *i* having a conical head which projects into a small groove cut into the rim of the pinion, through the action of a spiral spring *m*, thus ensuring that with a normal pressure the pinion will engage with the spindle and actuate the shutter. Should, however, the strain become too severe owing to any exceptional resistance preventing the sliding of the shutter, the head of the pin slides on the inclined

Generated on 2024-08-12 19:55 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

surface of the groove, thus forcing back the spring and disconnecting the pinion from the horizontal shaft, which remains free to turn and control all other shutters, leaving only the obstructed sidelight shutter open.

Fig. 4 also shows how easy it is with the arrangement now proposed to also close from the bridge the overboard discharge apertures. For this purpose a sluice valve must be fitted on each aperture between the usual storm valve, which sluice valve remains open at sea. For controlling the sluice valve from the bridge at the same time as the sidelight shutters, it is sufficient to fit a pinion *r* like that working each sidelight shutter on the horizontal shaft of the lowest 'tween deck, and a rack *n* engaging that pinion and controlling a lever arm *l* having its fulcrum attached to the ship's skin and directly working the valve rod. A slip coupling of the design already described, fitted between the pinion and the horizontal shaft, will leave the latter free to turn should an obstacle accidentally prevent the sluice valve closing.

The proposed arrangement is also suitable for immediately closing by hand, from the upper deck, each group of sidelights and overboard discharges fitted in the watertight compartment. For that purpose it is sufficient, as shown in Figs. 4 and 5, to fit near the piston rod of the cylinder a screwed rod *p* having fixed ends which may be turned by a handle, and also to fit on the piston rod a turning arc *q*, the free end of which may work as a female screw on the rod *p*.

By making the arm *q* engage with the screw *p* it is possible to work the piston rod by hand, and consequently also all the horizontal shafts connected to it.

The small cock *t*, cast solid with the cylinder, is so made as to allow, during the hand control, free communication between the two ends of the cylinder and simultaneously to cut out the connections of the latter with the hydraulic pipings. Such an arrangement of hand control fulfils in the best possible way the requirement of the International Convention that all valves on overboard discharges should be controlled from places situated on a deck higher than 7 feet above the low waterline, for with proposed arrangement all the valves fitted on each side of the ship within a watertight compartment would be controlled from a station above the bulkhead deck.

An experimental plant similar to the one now described was fitted in the last after watertight compartment of one of the large liners whose flooding calculations have been referred to in this paper: that plant includes twelve sidelights distributed in two 'tween decks and an overboard discharge valve. The working of the whole plant proved very satisfactory from all points of view, and the fitting of it in place did not present any difficulty.

The arrangement described for closing all the skin apertures is open to criticism, in that the sudden breaking of a cylinder or of the branch pipes to the latter, from a collision or explosion, would cause the pressure to fall throughout the hydraulic system and thus prevent the control from the bridge, not only of the skin apertures, but of the watertight doors. For this reason it may be advisable to have separate main piping for the control of the doors or a small automatic valve could be fitted at each point where a pipe to a cylinder branches from the main piping, these valves being so arranged as to shut off the flow of water from the main piping should the pressure in any of the branches suddenly fall.

It is evident that the proposed arrangement fully solves the problem of the immediate simultaneous closing from the bridge of all ship side openings in any emergency at sea, but in order to judge of the advisability of installing the system in a modern passenger ship we must also consider the questions of reliability, first cost and upkeep.

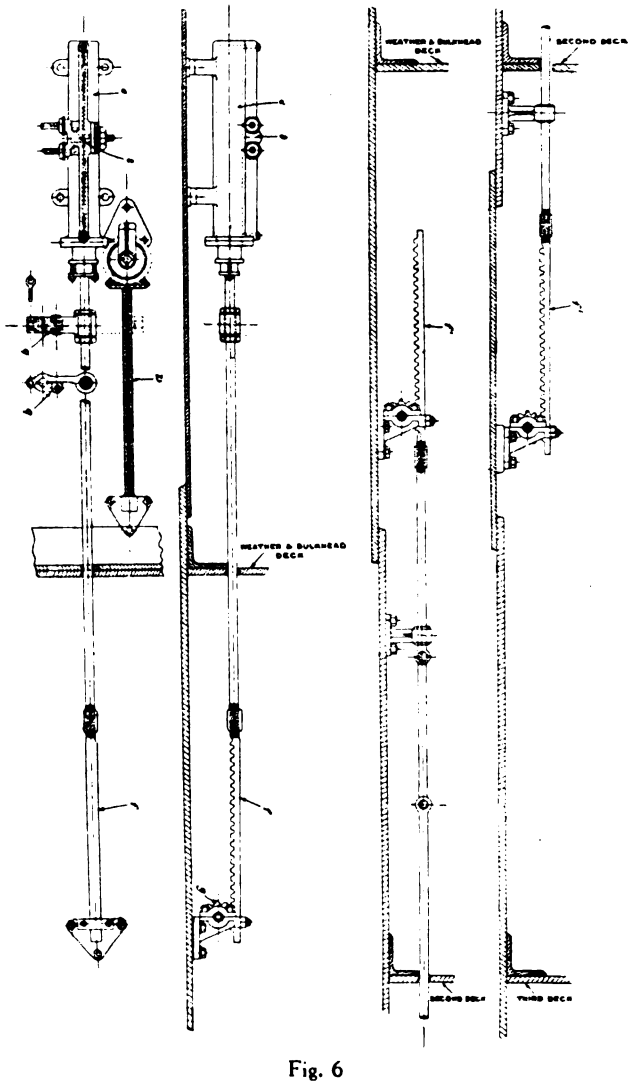


Fig. 6

With reference to reliability, it should be noted that even for a large liner the proposed arrangement entails nothing more than the fitting in each transverse watertight compartment of two very simple installations, one on each side, these installations being identical with each other and with the installations for all the other compartments of the ship. Each installation works independently from all the others, although they are all connected to the same main piping. As will be seen from Fig. 6, the various parts are plain and simple in design and are efficiently and strongly connected together. The moving parts are few and their movements are small and simple and not subject to shocks or reversals of load. The motive power, hydraulic, is the most reliable we can desire. Provided the upkeep of the packings of the small pistons and of the rod stuffing boxes be regularly attended to, no part of the whole plant should fail to work well. Another advantage of the arrangement is that the parts can be easily protected from interference by passengers. In fact, the sidelight shutters remain concealed in a metallic box, and the sluice valves also remain hidden in their boxes. Both the hydraulic cylinders and the controlling gears are fitted near the plating, within the depth of the frames, and are thus concealed by the inside lining in cabins, while in compartments having bare plating the whole plant may be readily protected by wood lining fitted over the frame space where the cylinder and the racks are

Generated on 2024-08-12 19:31 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

placed, and by a batten fitted in front of each horizontal shaft.

With reference to the question of initial cost, it is, of course, evident that the proposed arrangement will prove more costly than the usual arrangement of plain sidelights and overboard discharges, the increase in cost depending more or less upon the care bestowed upon the workmanship and the quality of materials used. I may say that estimates made by first-class firms for first-class plants to be fitted on board passenger ships having about four hundred sidelights and skin valves to be controlled from the bridge show that the extra cost does not reach 1½ percent of the total cost of the vessel: that is not a big figure to pay for the greatly increased safety of the vessel in damaged conditions—that is, for the possibility of converting the hull of the vessel, in any emergency at sea, into a hull without any aperture in the undamaged compartments, and thus fulfilling in fact the fundamental hypothesis on which the calculations referring to her floatability in damaged conditions are based.

With reference to the upkeep of the plant, this entails only the overhauling of the piston and rod stuffing box packings. Owing to the very small movement of the different parts, lubrication is not needed, especially if, as is advisable, pinions, racks, pinion bearings and rod guides are made of bronze or are bronze lined. Neither the sidelights nor any other part of the plant require any special survey or upkeep other than the usual inspection and cleaning periodically required by every plant on board a vessel when laying in harbor. If the precaution is taken to fit loose sheathing in contact with the moving parts, the periodical overhauling and cleaning will not present any difficulty.

U. S. Coast Guard Puts in Commission New Type of Self-bailing, Self-righting Motor Lifeboats

Motor lifeboats of a new type, self-bailing and self-righting, have recently been built by the Camden Anchor-Rockland Machine Company, at Camden, Maine, for the United States Coast Guard. Two of these boats were launched in July, and two more are now under construction, which will probably be launched in October. The first two boats have just been delivered at the Coast Guard Station, New York, having made the run to New York from Camden under their own power.

The boats are 36 feet long over all and 8 feet 8 inches beam. The power plant consists of a 40-horsepower model "F" Sterling motor, fitted with electricity and hand start-

Fig. 1.—Self-Righting Test of Motor Lifeboat

Fig. 2.—Latest Type of Coast Guard Motor Lifeboat Fully Rigged for Service

ers. The motor is installed in the after end box, which is a watertight compartment.

Lifeboats similar to these have been used by the United States Coast Guard for many years and are well known along the coast. The old style boats were fitted with centerboards, while in the new type of boat this centerboard is omitted, and the necessary changes are made in the design and construction to do away with the centerboard. The cockpit deck is above the waterline. It is watertight and is fitted with ten self-bailing copper tubes, tin lined. All the available space under the cockpit deck and all available space under the side seats in the cockpit, as well as the space under the floor in the forward end box, is filled with air cases made of clear white pine covered with canvas laid in glue and painted several coats.

The boats are so designed that when placed bottom up they will right themselves and at the same time bail themselves out. The builders were obliged by their contract to put one of the boats through such a test, which was successfully accomplished. The boat righted herself in three seconds and bailed herself out in fourteen seconds.

The material used in the construction of these boats is the very best to be had. The planking throughout is Port Orford cedar, the frames clear white oak, the fastenings copper and composition, and the general interior construction mahogany. The boats are planked diagonally, two courses of planking being used. Before applying the second course the first course is covered with canvas in one piece, laid in glue, which, considering its weight, is the most rigid construction obtainable.

These boats are fitted with two masts and three sails, and arranged to take eight oars. They will easily accommodate fifty persons, if the occasion ever requires it. Under power the boats show a speed of a little better than eight knots, which, considering the size of the power plant and the heavy construction, is remarkably good.

They are designed for patroling the coast and are assigned at the different Coast Guard stations.

Traffic Through the Panama Canal.—According to figures published in a recent issue of the *Canal Record*, containing a summary of traffic through the Panama Canal since its opening in August, 1914, until the close of business on July 30, 1917, the total number of vessels passing through the canal in this time was 3,751 and the cargo tons 15,339,093. The highest total occurred during the fiscal year 1917 when 1,876 vessels passed through the canal, the cargo measurement being 7,229,255 tons.

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

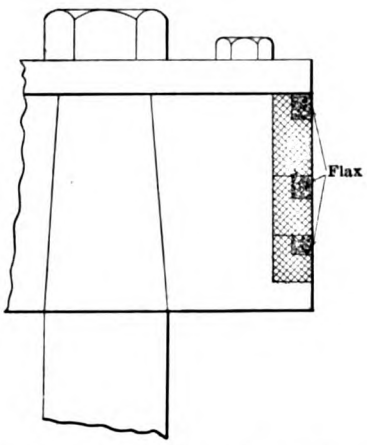
Letters from Marine Engineers

Discussion of the Design and Handling of Marine Engines, Boilers and Auxiliaries—Breakdowns at Sea and Repairs

This department is open to all readers of the magazine for the discussion of affairs in the engine room. All letters published are paid for at regular rates. Your ideas or experiences will be mutually helpful and interesting to other engineers. Write your letter now.

Combination Packing

The sketch shows how a set of combined flax and white metal packing was made for the plunger of one of our bilge pumps. We found that there was no 5/8-inch flax or hemp packing on board ship, and non-available at the port



Combined Flax and White Metal Packing

we were in. Having plenty of Babbit metal, and 3/8-inch flax, we decided to make the combination.

The working results were very good. Babbit metal alone soon gives trouble, due to the wear of coal and ash grit drawn up from the bilges. This combination packing proved to give long service; and, in fact, is still doing duty.

Concord, N. H. C. H. Willey.

Curiously Deflected Furnace

A peculiar case of deflected furnace crowns came to the writer's attention recently. A steamer was being brought around from the Great Lakes to an Atlantic port. This vessel was fitted with a jet condenser, having been built for use in fresh water only, and it was decided by her new owners that she could be brought around without installing a surface condenser, although she did not have any fresh water tanks.

Engineers from the Atlantic Coast, accustomed to navigating in salt water, were sent to bring the vessel around. Soon after leaving Montreal trouble developed with the boilers. The tubes and staybolts in the back combustion chamber of the starboard boiler leaked so badly that the fires would hardly burn. The port boiler furnished enough steam to keep going, although at very slow speed.

The culmination of the trouble came when both furnaces in the port boiler bagged. The engineers immediately hauled the fires and worked the pressure off, leaving the vessel helpless. A boat was sent ashore and a tug sent out to tow her in.

The furnaces were of the Adamson ring type, in three sections each, and were bagged in three places in the back section over the bridge-wall, to a depth of 12 inches. There were two bags in the center section of about the same depth, while there was only one bag in the front section about 3 inches deep.

Usually when this type of furnace becomes overheated they come down in one bag between the rings, and it is rather difficult to understand why these furnaces bagged as they did. There was one-half inch of scale over the entire furnaces, except where it had broken off where they came down, and the entire section should have heated evenly, although it is evident it did not.

The back ends of all the tubes were burned so badly that they had to be renewed, and about 350 staybolts in the back connections were found pulled through the sheets. The chief engineer was given a suspension of license for six months, which gave him time to learn something about the use of a jet condenser in salt water.

J. S.

A Pointer

A high vacuum is essential to economy, and to that end we must keep the vacuum or air pump in efficient condition. If the valve disks of the bucket plunger and valve decks are not tight, the efficiency of the pump is then impaired. As these valves are invariably made up of three thin circular bronze disks, they are very flexible, and when they become coated with heavy grease (and most all of them do) they soon collect grit and chips between themselves and their seats. This holds one edge

Fig.1

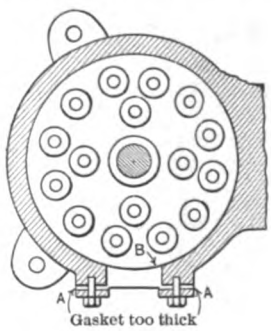


Fig.2

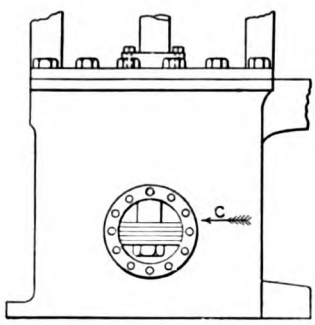


Fig.3

Fitting Handhole Plate to Barrel of Air Pump

of the valve off the seat and allows back leakage of a portion of the air and water. If a number of these valves get in this condition the vacuum drops and it becomes necessary to speed up the number of strokes per minute of the pump to maintain a fair vacuum. At the first chance the valves should be cleaned of this foreign matter.

To make the cleaning and inspection of the valves easy, as it has to be done often, most all air pumps have a hand-

Generated on 2024-08-12 19:50 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

hole plate fitted into the barrel of the pump, as shown in Fig. 3, at *C*. The shape of the inside surface of this manhole is that of the inside diameter of the cylinder. The manhole is fitted in place at the time of manufacture of the pump and bored at the same time as the cylinder, so that the inside of the plate is a part of the cylinder wall surface. This plate is then marked with suitable figures and marks, in order that it will always be fitted in its place correctly—something in the manner shown in Fig. 1. Care should be taken that these marks are not painted over.

Fig. 2 at *A* shows a pointer to watch out for in placing this plate back on after the cleaning or inspection is finished. A gasket of just the correct thickness, which is generally a thin piece of brown paper soaked in linseed oil, must be used; for if a too thick gasket is used it will leave a clearance between the surface of the plate and the edge of the plunger—as shown at *B*, Fig. 2. Each time the plunger passes this part of the cylinder there will be a back leakage, due to this opening, and if more than one plate is fitted to the cylinder it seriously affects the condition of the pump. An easy way to make sure that the plate is in correct place is to place the pump plunger in position, as shown in Fig. 3 at *C*, and lay a piece of thin, soft lead wire over the edge of the plunger and then put the plate on and secure tight. Remove it again and note the thickness of the lead. If O. K. replace and secure.

C. H. WILLEY.

Concord, N. H.

Piston Area Chart

To subtract the area of the piston rod has always been a sort of "pest" for engineers in general when making computations for horsepower directly from indicator diagrams. The head end of the cylinder has always been easy enough to work out, but the crank end invariably contains that infernal piston rod.

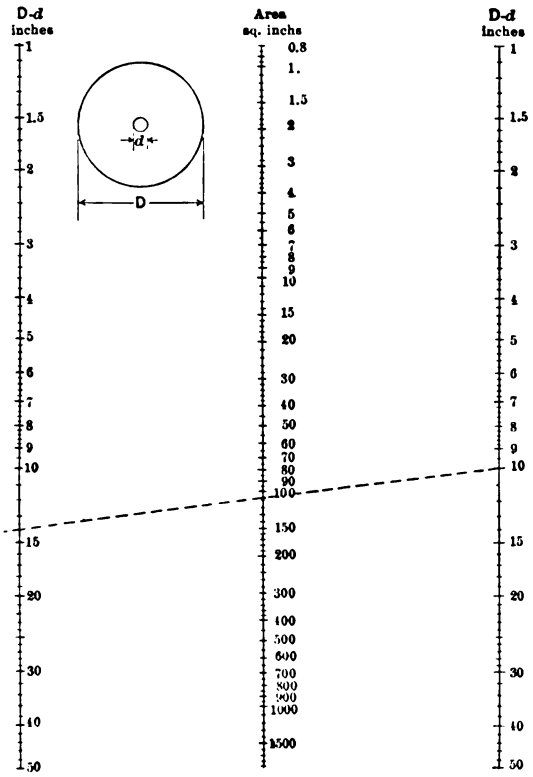


Chart No. 1, Giving Piston Area

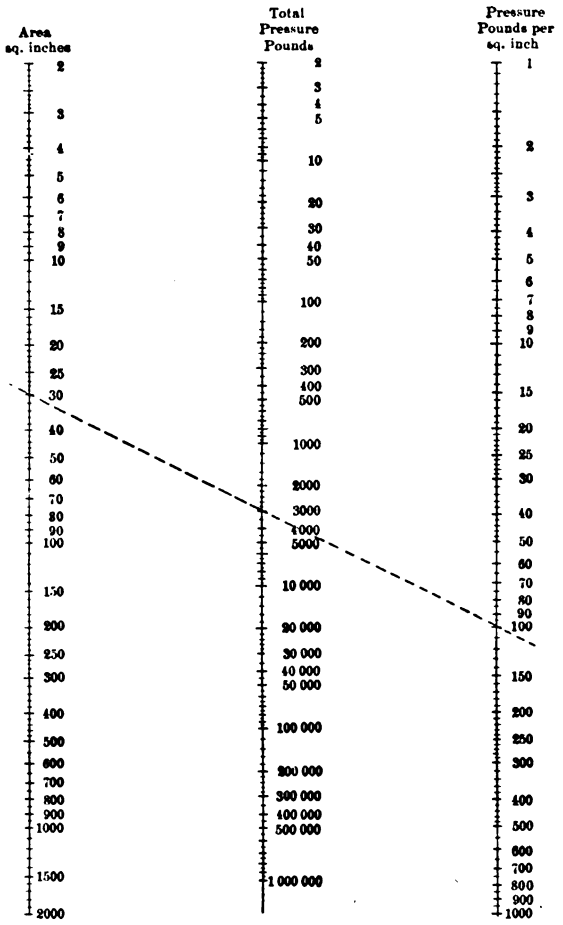


Chart No. 2, Giving "Area × Pressure"

The other day I hit on a scheme for lightening the labors of making computation of this sort, and prepared Chart No. 1 for that purpose. I believe the idea is "brand new" and it works as follows:

Where D = diameter of cylinder in inches,
and d = diameter of piston rod in inches,

just add D and d and find the corresponding figure in the left-hand column of the chart. Then subtract d from D and find the corresponding figure in the right-hand column. Connect the two figures with a straight line and the middle column gives the area with the piston rod area already subtracted.

If the chart isn't accurate enough for you it will at least tell you whether or not your long-hand figures are "anywhere near accurate."

For example, I have chosen a 12-inch cylinder and a 2-inch rod. My figures, therefore, are 14 and 10, and the middle column shows the area to be very close to 108 square inches. Computed the long-hand way, I find the area to be actually 108.2 square inches. So the chart is fairly close.

The chart can also be used just as readily for finding the area of the head end of the piston. In that case d = 0, and we have to use D in each column.

For example: Find the area of a 10-inch circle. Just connect 10 in the left-hand column with 10 in the right-hand column, and the intersection will come close to 78. Mentally, perhaps, you can figure that the exact area of a 10-inch circle is 78.54 square inches. It happens to be exactly equal to 25 π.

"AREA × PRESSURE" CHART

After finding the area of the piston we always have to multiply by the "mean effective pressure." To lighten

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

that task, or at least to make you sure of your figures and decimal points, Chart No. 2 was designed.

The chart is very simple and needs no further explanation. The dotted line drawn across shows that 30 × 100 = 3,000. The range of the chart is wide enough for almost any steam pump or hydraulic problem inside of 1,000 pounds per square inch. N. G. NEAR.

New York.

Finding "Faults" in Electric Wiring

Breakdowns of the insulation of cables, leading to faults later on, may often be avoided by periodical tests of the insulation of the cables, followed by an examination of those in which the insulation shows signs of deterioration. The insulation test is a very simple one; it is shown diagrammatically in Fig. 1. An instrument made for the

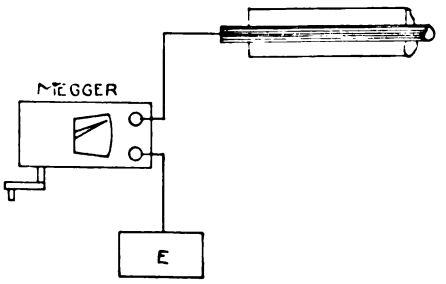


Fig. 1.—Diagram Showing How the Insulation Test Upon Insulated Cables is Carried Out by Means of the "Megger"

One terminal of the megger is connected to "earth," the frame of the ship and the outside of the cable; the armor or the lead covering also makes more or less good connection with the frame of the ship, so that the megger measures the leakage current through the insulating envelope of the cable, and from that the insulation resistance has been calculated, the dial of the instrument being arranged to read that quantity direct

purpose, and called by various names; one sold in the United Kingdom is called "megger," because it measures the insulation resistance in megohms. The megohm is a million ohms, and well-insulated cable always has an insulation resistance of several hundred megohms per mile before it is fixed. The tests can easily be carried out in harbor; but in doing so each length of cable should be taken separately, the conductor at one end being connected to the "megger," and at the other end left free in air, as shown in the figure. Insulation tests of the whole distribution system may also be taken with advantage at sea, but the result of those tests will be a very much lower resistance than that of any single cable, because of the leakage which takes place at every fitting.

Usually the first warning of a "short," unless careful tests have been made periodically, on the lines indicated above, is the blowing of a fuse, and then the trouble begins. The blowing of a fuse is not always a certain indication of a "short," because fuses themselves are unreliable after they have been in service a certain time. Like everything else, fuses have been enormously improved during the last twenty years; but even the best fuses are liable to deterioration. The metals of which the fuses are composed oxidize, and though this process goes on very slowly it has the effect of gradually lessening the sectional area of the fuse, increasing its electrical resistance, thereby increasing the heat liberated by any current passing through it, and lessening its mechanical strength. In addition, fuses on board ship are exposed to a number of stresses due to the vibration of the engine, the working of the ship in a heavy seaway, and so on, and these tend to loosen it.

A very useful appliance for testing for "shorts," when they are suspected, is an incandescent lamp of the pressure of the service, fitted with a pair of connections, as shown

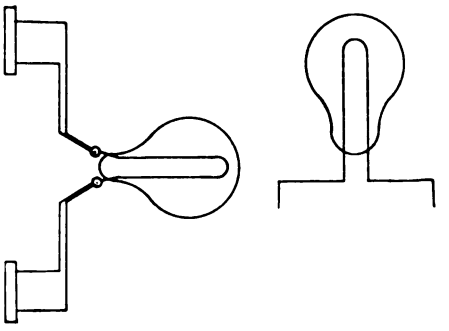


Fig. 2.—Diagram Showing How an Incandescent Lamp Can Be Arranged with Plate Terminals to Slip Between Fuse Locks

in Fig. 2, so that the connections can be pushed between the clips of a pair of fuse contacts. If there is a "short" on, the lamp will light up; if the fuse blew because it had deteriorated, the lamp would not light, and this may be confirmed by placing another fuse in position.

Shorts are somtimes intermittent, especially on flexible cords; the two conductors may get together temporarily, blow a fuse and then fall apart. Intermittent faults are the most troublesome of all; they can only be watched for. If the lamp lights up it is a sure indication that the "short" is in whatever wires are controlled by that fuse, and if the fuse is either on the main switchboard or a main distribution board, the matter may be followed by removing the fuses of the next board, then replacing the fuse in the board nearer to the dynamo, then inserting the lamp in place of each fuse in succession. This course may be followed, from distribution board to distribution board, until the pair of cables or wires, or the single cable or wire where the single-wire system is used, is denoted.

"Shorts" occur in all sorts of places on board ship; sometimes on main feeders, sometimes on sub-feeders, and sometimes on the smaller wires. If the fault is on a main feeder it will be shown by the lamp lighting when placed in the fuse blocks of all the sub-feeders; and similarly if the fault is in a sub-feeder, it will be indicated by the lamp lighting up when it is placed in all the fuse blocks of the branch wires.

It will be understood that the lamp is so valuable for this test because it saves the wasting of fuses and it gives a very clear indication of where the trouble is, and it can be safely used because its resistance is sufficient to reduce the current flowing through the "short" to the figure the lamp can stand. One trouble with heavy "shorts," connections between large main feeders, or cables carrying large currents temporarily, always is the difficulty of handling the large currents. As long as the "short" is on, immediately a connection is made in the ordinary way, a heavy current flows and a considerable amount of heat is liberated in the conductor and in everything connected with it. When an incandescent lamp is inserted in the circuit only the current that lamp can accommodate flows, because the fuse blocks where the lamp is inserted now take the place of the lamp holder, and the pressure at the fuse blocks is the same as would exist at the terminals of the lamp holder under ordinary working conditions. The lamp also may sometimes perform another useful service: it may indicate a partial short circuit by causing the lamp filament to glow at a lower temperature.

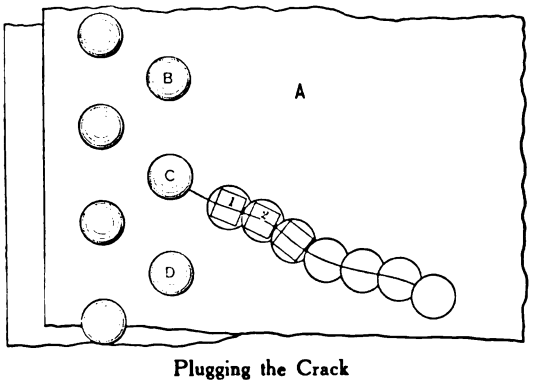
Generated on 2024-08-12 19:55 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Emergency Repair of Crack in Boiler Shell

When this war broke out, I wanted to do my "bit," and, being twenty-eight years old and a boiler maker by trade, I went down to the navy yard and told them I wanted to enlist. They looked at my teeth, weighed me and punched me and asked me questions, and then I was accepted. I was sent aboard a ship a day or two after.

I am not a sailor, but I had been on a good many trial trips of ships and never was seasick, so I enjoyed the life for the first ten days, only I didn't have much to do. There was a sort of a boss boiler maker and another fellow named Cary on board. Everything went so smoothly I thought I wasn't going to get much experience, but at the end of the first ten days I saw something done which was new to me, so I thought it might interest your readers.

I am not much at making sketches, but here is one which will perhaps help out my description.



Plugging the Crack

The ship was fitted with four shell boilers which were quite new. One afternoon No. 3 boiler seemed to be leaking at the front end and Cary and I were ordered to go up on the boiler to see what the trouble was. When we got up under the deck beams it was so hot we could hardly see, but we ripped off the covering of the boiler and found a crack running from one of the rivets of the tube sheet down towards the longitudinal seam for a distance of about five inches.

The crack wasn't leaking badly, but spitting water and steam all the time. When we got down we reported and the chief engineer was sent for. When he had taken a look at the crack he was pretty red in the face and looked mighty sober. He ordered the boiler cut out and told the firemen to let the fire die down; then he went up on deck to talk with the captain. When he came down he said we would have to put a patch on the leak and wanted to know how long it would take us.

The foreman boiler maker looked it over and said it would take sixteen hours, as a man could not work up there on the boiler top for any length of time on account of the heat. But the captain wouldn't listen to this; he had to get somewhere and he had to have that boiler. Cary suddenly stepped up to the chief and said: "I have only been in the navy a short time and I may be getting in all wrong with you, but if you want that leak stopped I can do it inside of two hours if you will give me the men." The chief asked how he could do it, and Cary, taking a piece of paper and pencil, made a sketch and described his idea. After thinking the matter over a moment, the chief turned to the boss boiler maker and said: "See that this man gets all the help he wants. His suggestion will answer, but we will have to watch that leak carefully."

Carey got the carpenter down and got him to make a kind of backing up under the deck beams for the electric drill. Then he sent me up to the machine shop to have them make seven pipe plugs out of bar steel. A young officer went up with me and gave orders that the plugs were to be rushed right through. The head machinist was a clever fellow. He put a piece of bar steel through the head of the lathe, held it in the chuck, tapered the plug, then ran the die over it, cut it off long enough to leave the squares, screwed it into the T-fitting and shaped off the squares in a little shaper they had.

I went into the boiler room and by this time the steam had run down so that there was no pressure on the boiler. Cary and I got up on top of the boiler and he drilled the first hole through the boiler shell as shown on sketch and marked No. 1. This he tapped. Of course the electric drill was used, its head backing up against the rig that the carpenter had rigged up.

We had to wait a few minutes for the first plug, but it gave us time to cool off and get a rest. Then we screwed in the first plug, bringing the square so that when we drilled the second hole, for plug No. 2, it wasn't in the way of the drill which, it will be noticed, cut into plug No. 1 as well as into the shell of the boiler. Here is just the whole trick; if the plugs didn't cut into each other, there would be a steam leak between them.

We went down the crack to its end and a little beyond, as shown in the sketch, taking several rests, but we got the last plug in one hour and twenty-five minutes after we started, although we were both played out with the hard work and the heat.

The chief took a look at it and ordered steam got on the boiler. Then it was connected up with the rest of the battery and the plugs failed to show a bit of a leak anywhere.

We got an extra five days' leave when we came to port, but there has been no end of discussion on the ship as to whether the plugs weakened the boiler or strengthened it. They put a patch on while Cary and I were ashore. If I get nothing else out of my Government job, I think I have learned a clever trick, and so I am passing it along to others.

New York. A. FLOAT.

BOOK REVIEW

AMERICAN BUREAU OF SHIPPING, GREAT LAKES DEPARTMENT, 1917. Size, 12 by 8 inches. New York, 1917: American Bureau of Shipping. Price, $25.

Since the reorganization of the American Bureau of Shipping, the publication formerly known as the *Great Lakes Register* is now published as the Great Lakes Department of the American Bureau of Shipping. The *Register* contains complete lists of steam and sailing vessels on the Great Lakes, giving main particulars of both the hull and machinery, as well as the names of the builders, owners, date of construction, etc. At the end of the book are given a list of American owners and managers and also a list of Canadian owners and managers. The book is completed by miscellaneous tables of data, giving sailing distances on the Great Lakes, a list of the dry docks, floating docks and marine railways, as well as a list of the lake vessels whose names have been changed and shipbuilders on the Great Lakes.

The book is conveniently arranged and indexed so that it can be used for ready reference. The data regarding the steam and sailing vessels are tabulated in sequences and blank spaces are provided for the insertion of additional items. Supplements are issued during the year.

Generated on 2024-08-12 19:11 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Questions and Answers for Marine Engineers

Inquiries of General Interest Regarding Marine Engineering and Shipbuilding will be Answered in this Department

CONDUCTED BY H. A. EVERETT *

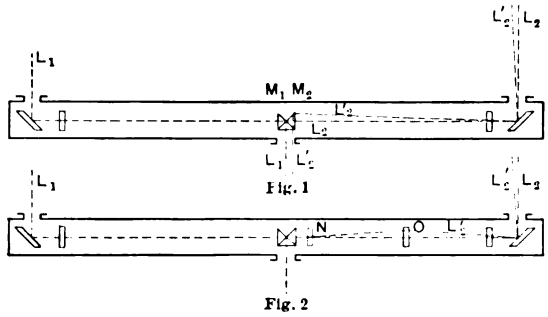
This department is maintained for the service of practical marine engineers, draftsmen and shipbuilders. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so. Indicator cards taken from marine engines will be carefully analyzed, the defects pointed out and the horsepower calculated, provided complete data are sent with cards.

Range Finding

Q. (894).—Please recommend a book explaining how ranges are found for directing the fire on board ship at sea.

A. (894).—There is an excellent chapter on the general subject of range finding at sea in the following text-book: "Ordnance and Gunnery," a text-book for the use of midshipmen at the U. S. Naval Academy, published by the U. S. Naval Institute, 1910, and in the 1915 edition entitled "Naval Ordnance" (same publishers, cost $4.85). The latest type of the Barr & Stroud range finder is described in detail and instruction given as to its use and care (Chapter XXI). The following statement of the basic principles is abstracted from this.

Barr & Stroud Range-Finder.—The Barr & Stroud range-finder belongs to the short-base, single-observer class, and is constructed to work on the "coincidence" principle. Figs. 1 and 2 are diagrammatic representations



Diagrammatic Sketches of Range Finder

of the instrument, details of construction being omitted for the sake of clearness in the explanation of the principle of operation.

The principle of the instrument depends upon the diverging angle at which the rays of light come from the target to the reflectors. Fig. 1 is a diagrammatic representation of the elements of the range-finder reduced to their simplest form. Two beams of light from the distant object are received by the reflectors and transmitted through the objectives towards the center of the instrument, where two small mirrors, M_1, M_2, are placed, one over the other, to reflect the rays outward through the right eyepiece. In this way, two partial images of the distant object are seen, one over the other; the image seen in the upper half of the field of view being formed by the equivalent of a telescope directed towards the distant object from the *right* end of the instrument, and the image seen in the lower half being formed by the equivalent of a second telescope directed towards the distant object from the *left* end. The images are separated by a thin, black line called the separating line.

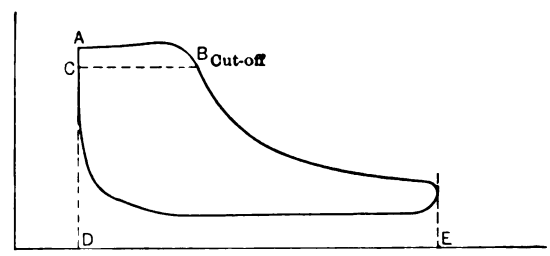
If the object approaches the instrument in the direction of the beam L_1, the beam L_2 will have a new direction, such as is indicated by the line L_2', and the partial images will no longer be seen in the eyepiece in proper coincidence. Accordingly, means are provided (1) for altering the path of one of the beams as it approaches the central mirrors, so as to bring the partial images into correct alinement or coincidence, and (2) for indicating on a scale the distance that is moved in sympathy with the motion of the mechanism which produces the alinement of the images. The alinement of the partial images is effected by causing one of the beams (in its course from the objective to the central reflectors) to pass through a deflecting prism of small angle, which is movable in the direction of the length of the tube, and is moved into the required position by the operation of a working head situated on the outside of the tube. The action of the prism is illustrated in Fig. 2.

The scale, which consists of a straight piece of translucent ivory, is seen through the left eye-piece, and is caused to move past a fixed pointer which indicates the range of the object whose images have been alined in the right eye-field of the instrument. The observer need not move his eyes away from the eyepieces to keep a moving object in view and read its distance as often as he desires.

Cut-Off on Indicator Card

Q. (901).—How do you figure the cut-off from an indicator card?

A. (901).—The point of cut-off is usually located where the admission and expansion lines interesect, *i. e.*, where



Indicator Card Showing Point of Cut-Off

the diagram changes its curvature from convex to concave. The cut-off percentage is the ratio of *C B* to *D E*.

Defects in Cast Steel Valve Bodies

Q. (906).—In inspecting cast steel valve bodies, what are the commonest defects met with? Should a porous casting be rejected, or is it possible for the manufacturer to make it tight?

A. (906).—Steel castings commonly possess any or all of the following defects: porosity, blow-holes, sand pits, blisters and cracks, each of which may be remedied if not of too serious a nature. Porosity, if slight and local, may be corrected by peening, but if extended the casting should be replaced.

* Professor of Marine Engineering, Post Graduate Department, United States Naval Academy, Annapolis, Md.

Generated on 2024-08-12 19:16 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Ljungstrom Steam Turbine

Q. (907).—What is the Ljungström steam turbine, and is it an important type or is it a modification of the Parsons or Curtis types?

A. (907).—The Ljungström steam turbine is a radial flow reaction turbine, with blades carried on two concentric disks rotating in opposite directions. The steam enters from the shaft, flows radially, expanding to the exhaust, located in the rim. It operates at high speed and is capable of using very high pressures and superheat, all of which tend to give it a low steam consumption. Its reported economy is probably the best of any commercial turbine. It usually drives direct two A. C. electric generators, which are kept in step electrically and thus maintain the proper relationship of the turbine disks. It has been applied to ship propulsion with excellent results and has been seriously considered for submarines. The parent company is the Swedish Ljungström Steam Turbine Company, Ltd., of Friespong, Sweden, but one of the large American electrical firms is the American licensee.

Mean Effective Pressure Referred to Low Pressure Cylinder of Triple Expansion Engine

Q. (908).—What should be the mean effective pressure referred to the low pressure cylinder of a modern three-cylinder, triple expansion engine taking steam at 190 pounds gage and with a vacuum of 27 inches?

A. (908).—For best economy, about 45 pounds per square inch.

Reinforced Concrete Ships

Q. (909).—Are there any successful reinforced concrete seagoing ships?

A. (909).—No. Reinforced concrete has been used with varying degrees of success for barges, pontoons and vessels for inland waterway navigation up to 150 feet in length and even greater, but there has been no case of a successful seagoing self-propelled vessel of reasonable size. There has been much attention directed toward it of late, however, and it is probable that its field will considerably broaden for small craft.

Tests for Gasoline (Petrol) Engine Cylinders

Q. (910).—Is there any pressure test required for gasoline (petrol) engine cylinders.

A. (910).—Lloyd's rules for internal combustion engines require that : "The cylinders are to be tested by hydraulic pressure to twice the working pressure to which they will be subjected. The water jackets of the cylinders to 50 pounds per square inch, and the exhaust pipes and silencer to 100 pounds per square inch."

Ratio of Gear Reduction on U. S. S. Neptune

Q. (911).—Will you please tell me the amount of the gear reduction which is used on the U. S. S. *Neptune*? If you can refer me to a descriptive article on this installation, I should much appreciate it.

A. (911).—The ratio of propeller shaft to the turbine shaft is 1 to 9.04. For an excellent description see "Notes on the Performance of the Reduction Gear and of the Bridge Control System of the U. S. S. *Neptune*," which was published in the *Journal of the American Society of Naval Engineers*, August, 1912. Vol XXIV, No. 3, Page 987 *et seq.*

Sperry Searchlight

Q. (913).—What is the candlepower of the new Sperry searchlight which is being used in this country and England? Can you give me a brief description of its principal features?

A. (913).—The following from *Aviation*, April 15, 1917, gives the most recent published information:

"It illuminates a target ten times as brilliantly as an ordinary projector, and its arc is as bright as sunlight.

"The brilliancy of this lamp is due, among other things, to the special carbons. The arc burns at a temperature of 10,000 degrees F. The candlepower of the 60-inch Sperry searchlight exceeds 1,250,000,000.

"An important feature of this searchlight is the remote control, which is very desirable for anti-aircraft work. By means of this apparatus the lamp can be operated, even upward at an angle of 90 degrees, from a distance as great as one mile. This lamp can be used for other purposes, such as coast defense work, for which its long range makes it specially suited. The 60-inch Sperry searchlight has been seen 150 miles away. The lamp can also be used for signaling and is installed on naval vessels.

"The installation of these new searchlights, together with the use of incendiary bullets for machine guns, is said to have resulted in the stopping of Zeppelin raids on London. Searchlights stationed at coast towns pick up the Zeppelins and permit the heavier than air machines to destroy them."

Torsional Vibration in Shafting

Q. (912).—What is the principal factor in causing torsional vibration in line and propeller shafting?

A. (912).—Briefly, irregularities in turning moment which synchronized with the torsional period of the shafting and propeller. This is most frequently due to faulty apportionment of work among the cylinders.

Engler Scale of Viscosity of Oil

Q. (914).—Will you please explain to me what is meant when the viscosity of an oil is quoted as so many degrees Engler?

A. (914).—Degrees Engler means simply the ratio of the time it takes a given quantity of an oil to flow through a standard orifice as compared to the time it would take the same volume of water to flow through.

Metacenter

Q. (915).—Will you be willing to give me some sort of a description of what the metacenter is? Some description that is in words, not figures. I think if I can once get clearly into my mind some definite conception of it, I will be much helped in my understanding of the many problems in naval architecture which deal with it. As it is, I have read the definitions in several text-books, but do not get a very clear idea, perhaps because of my lack of facility in reading mathematics.

A. (915).—I think it will help you to read the following quotation upon metacenter from Rear Admiral D. W. Taylor's (Chief Constructor, U. S. N.) paper, presented before the Franklin Institute recently:

"In mathematical language, the metacenter is the center of curvature of the locus of the center of buoyancy of the vessel as it is inclined. As a practical proposition the metacenter is the limit above which we cannot locate the center of gravity of the ship without having it initially unstable and unable to remain upright. The position in space of this imaginary point depends upon the geometrical form and the dimensions of the ship. Perhaps a homely illustration may clarify the matter. If you take an ordinary rocking chair and attach a weight to it in such a manner that the center of gravity of the chair and the weight is above the center of curvature of the rocker, the chair will not stay put, but will roll and capsize. If the center of gravity is materially below the center of curvature of the rocker, which is the case when one sits in an ordinary rocking chair, the chair will remain in a fixed position; if the rocker is very flat, resulting in a greater distance of the center of gravity below the center of curvature, the chair will be stiff and harder to rock or heel from the upright position. The metacenter of a ship corresponds very closely with the center of curvature of the rocker, as already described.

"The metacentric conception applies only to initial stability with the vessel upright."

Generated on 2024-08-12 19:56 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

MODERN MARINE TERMINAL AT BEAUMONT, TEXAS

Designed by H. McL. Harding, Consulting Engineer, New York

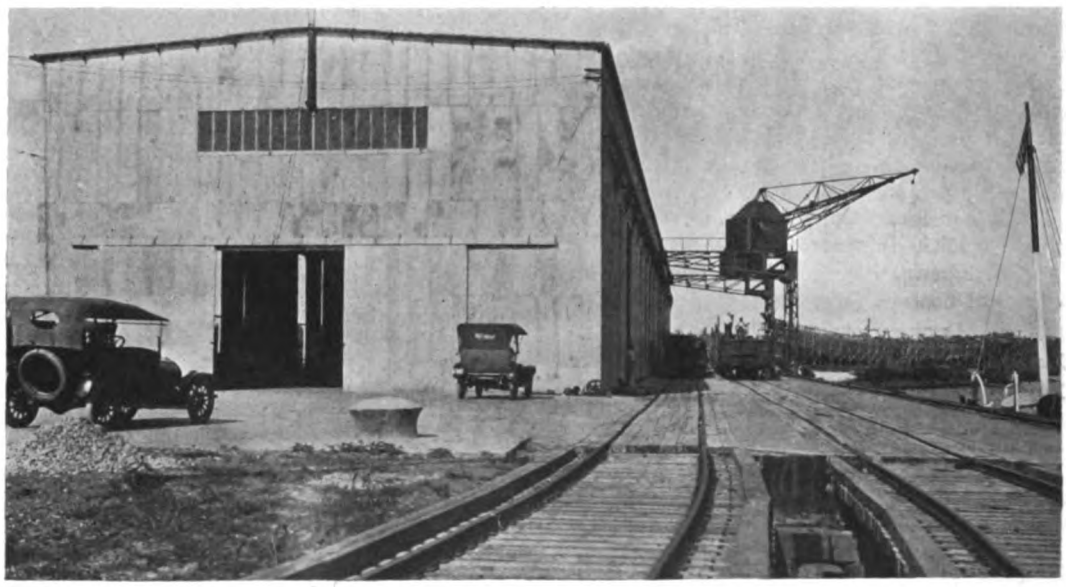


Fig. 1.—West End of Quay and Shed Showing Half-Arch Gantry Cranes Serving Shed, Railroad Tracks and Drayway

Fig. 2.—Half-Arch, Traveling, Gantry Jib Cranes; Capacity at 200 Feet Per Minute, 2 Tons; Traveling Speed; 300 Feet Per Minute; Revolving Speed, 3 Revolutions Per Minute

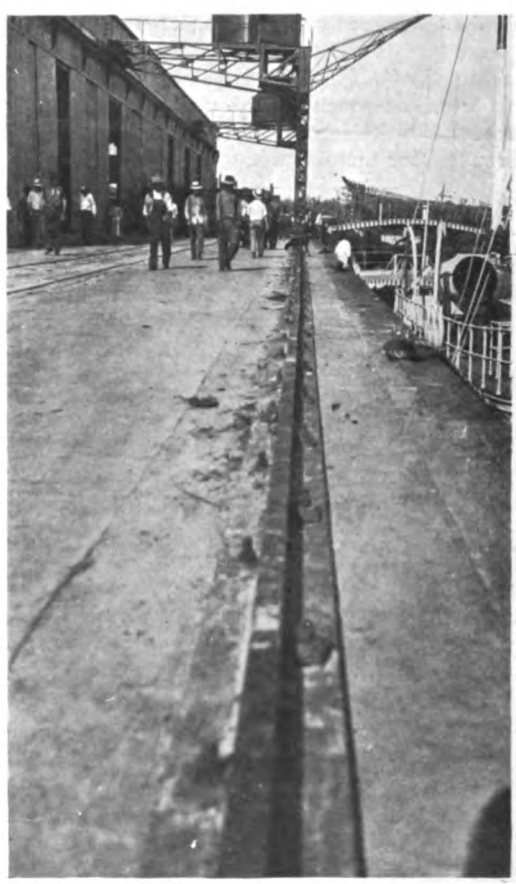


Fig. 3.—Surface Crane Rail 2 Feet from Edge of Quay Wall. Elevated Rail Attached to Shed Wall. Clear Height of Under Side of Gantry, 24 Feet; Height of Crane Hook Above Rail, 50 Feet

Generated on 2024-08-12 19:29 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Shipbuilding and General Marine News

Contracts for New Ships—Shipyard Improvements—Engineering Projects—Improved Appliances—Personal Items

AMERICAN MERCHANT MARINE TO TOTAL OVER 13,000,000 TONS OF SHIPPING

Nearly 3,000,000 Tons Now Engaged in Foreign Trade

United States Will Have 1,600 Merchant Ships, Aggregating 9,200,000 Tons, by End of 1918

The United States has to-day 458 ships of over 1,500 tons deadweight each with an aggregate tonnage of 2,871,359, either engaged in or capable of participating in foreign trade, according to figures just published by the Shipping Board.

There are also 117 ships of 700,285 tons of German or Austrian origin. Further, the Emergency Fleet Corporation has commandeered nearly 400 steel ships of more than 2,500,000 tons, which are being completed or under contract for construction in American yards. The Fleet Corporation has also contracted for 636 ships of 3,124,700 tons.

Totaled, these figures show that the United States will have near the end of 1918 a merchant fleet of more than 1,600 ships aggregating 9,200,000 tons to carry its foreign commerce, as compared with an overseas fleet of 1,614,222 tons on June 30, 1914, scarcely a month before the European War began.

The tonnage referred to is exclusive of that engaged on inland waters, unsuitable coastwise craft operating along the coast and in bays and harbors, and does not, of course, include the prospective additional programme of the Emergency Fleet Corporation.

The fleet in prospect is already becoming a reality. Several of the commandeered ships are already taking cargoes; others will leave the ways in increasing numbers with each succeeding month. The ships for which the Shipping Board has contracted are under construction and the first launching is expected within sixty to ninety days.

American Ships Requisitioned

The Shipping Board announces that every American merchant vessel of more than 2,500 tons deadweight carrying capacity available for ocean service will be requisitioned by the Government on October 15. The total tonnage available for this purpose is slightly over 2,000,000.

The rates at which these vessels will be chartered by the Government involve a sharp reduction in present charter rates.

Welding Ring Appointed Chairman of Ship Chartering Board

Welding Ring, a shipping man of New York, has accepted the position of chairman of the projected chartering board which will operate under the Emergency Fleet Corporation. Two other shipping experts will serve with him on the chartering board.

The new chartering board will have authority to approve and grant all charters for all American vessels. In this way it is expected that the Shipping Board will have absolute jurisdiction over all American shipping, and will enforce a schedule of freight rates for transportation of war shipments. The chartering board will sit in New York.

The new board will co-operate with Allied shipping control agencies to effect virtually a domination of the world's tonnage.

Atlantic Deeper Waterways Meeting

The tenth annual meeting of the Atlantic Deeper Waterways Association will be held in Miami, Fla., from November 27 to December 1. An interesting programme of business sessions and entertainments is being arranged, and an opportunity will be given the visiting delegates to see the waterway improvements under way in Miami and vicinity, where the city is constructing a public dock 1,000 feet long, with a public terminal railroad, and a commodious channel and causeway is being built by Dade County. An access to these improvements is being provided by the Government channel and jetties connecting with the ocean.

Shipbuilding Contracts

It is reported that the William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., has received a contract from the Navy Department, Washington, D. C., to build about thirty destroyers, to cost in the neighborhood of $37,000,000. This company has under contract a total of twenty-one destroyers and two scout cruisers.

Oscar Daniels & Company, Brunswick, Ga., are reported to have received a contract from the United States Shipping Board to build several steel vessels at a plant to be erected at Brunswick.

It is reported that more than 125 vessels are under contract in the shipyards of the State of Oregon.

The Cushman & McKown Shipbuilding Company, Wilmington, N. C., is building a 1,500-ton freight steamship.

Wright & Cobb, Rockland, Me., are building a 300-foot freight steamship for the Great Northern Paper Company.

The Housatonic Shipbuilding Company, Bridgeport, Conn., has received a contract to build ten wooden ships.

CONTRACTS FOR GOVERNMENT SHIPYARDS SIGNED

Three Yards to Be Built for Construction of Fabricated Steel Ships

Vessels of 5,000, 7,500 and 9,000 Tons to Be Built

Contracts for the construction of a Government-owned fabricated steel shipbuilding plant on Hog Island, near Philadelphia, Pa., were signed by officials of the United States Shipping Board Emergency Fleet Corporation with the American International Corporation on September 13. This contract calls for the construction of fifty fabricated steel vessels of 7,500 tons deadweight carrying capacity, although provision is made for increasing the number to 200 when the necessary funds are appropriated by Congress.

More recently contracts have been signed with the Submarine Boat Corporation, of New York, for the construction of a similar plant on Newark Bay for the building of fifty standardized fabricated steel cargo ships of 5,000 tons deadweight carrying capacity each, and with the Merchants Shipbuilding Corporation, of Chester, Pa., for the construction of 9,000-ton cargo ships of fabricated steel. The contract with the Submarine Boat Corporation calls for deliveries to begin in June, 1918, and for the entire fifty vessels to be completed by December 31, 1918. This contract will involve the expenditure of approximately $40,000,000.

The building programme, it was announced to Congress, will cost in all about $400,000,000. It has been reported that the Government will bear the expense for the construction of the three shipyards, and that $35,000,000 will be required for this purpose. The contract with the American International Corporation for fifty 7,500-ton ships will total $55,000,000 as a basic price. The actual cost, however, will vary according to the fluctuations in the cost of material, labor and other items of expense.

Never before have shipbuilding contracts of this magnitude been entered into in the United States. It is understood that contracts for the fabricated material required by the American International Corporation and the Submarine Boat Corporation will be sublet by the contractors through a joint commission appointed by the two companies, so that no disastrous competition or congestion will cause any serious delays in getting out the work. Details of the designs of the ships have so far been withheld.

It is believed that ten or twelve months will be required for building the first 7,500-ton ship.

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

New Shipyards Planned and Under Construction

The plant of Grant-Smith-Guthrie-McDougall Company, Portland, Ore., is nearly completed. This company is reported to have contracts to build fourteen steel ships.

The Schaw-Batcher Company has bought 172 acres of land at Redwood City, Cal., where it will build a shipyard. The company is reported to have received a contract to build eight steel steamers.

The Pacific Steamship Company, San Francisco, Cal., has purchased a shipyard site at Brandon, Ore., where it will build wooden schooners.

The Naul Shipbuilding Company has been incorporated at Wilmington, N. C., by A. P. S. Naul, George Rountree and Thomas W. Davis. A 6-acre site has been secured for a wooden shipyard.

The American Shipbuilding Company, Richmond, Va., is said to be planning the construction of a steel fabricating works for ship construction. The headquarters of the company are at 11 Broadway, New York. S. H. Brown is president.

The Union Timber Products Company, Seattle, Wash., will build a wooden shipyard at Port Townsend, Wash.

The Hall Steamship Company has been incorporated for the purpose of building a shipyard. Madison C. Hall, C. N. Riker and S. W. Harrington, all of Washington, D. C., are the incorporators.

Heldenfels Bros., Beeville, Tex., are planning to build a shipyard near Rockport. They are reported to have received a contract from the Government to build four wooden hulls.

The Hampton Roads Shipbuilding & Dry Dock Company, Norfolk, Va., has been incorporated, and is reported to have secured a site at West Norfolk. Gaylord W. Feaga is president; J. D. Carey, vice-president, and J. T. Sweeney, secretary and treasurer. The present headquarters are at the offices of the Gaylord W. Feaga Company, Citizens' building, Cleveland, Ohio.

The Erickson Engineering Company, Seattle, Wash., has been organized by C. J. Erickson, Downs Block, Seattle, and others. It is the purpose of the company to build ships at a yard on the Duwamish River.

The Concrete Fabricating Company has been incorporated to build steel and concrete barges and boats. W. S. Sawyer, J. T. Brady and C. F. Daly, 308 West Fifteenth street, New York, are the incorporators.

The Foundation Company, 233 Broadway, New York, will build shipbuilding plants at Portland, Ore., and at Vancouver, Wash., in addition to other locations already announced.

Arthur W. Brittain, 65 Cedar street, New York, and others, have incorporated the Continental Shipbuilding Company.

The Manistee Shipbuilding Company, Manistee, Mich., will begin operations about October 1.

The Merchant Marine Construction Company has been incorporated, with offices at 308 Haas building, Los Angeles, Cal. The company has secured a site of 10 acres at Long Beach, and will invite bids on steel ships. P. Livingston Barnes is the general manager.

The California Shipbuilding Company, Long Beach, Cal., is planning extensive enlargements to its plant, and is reported to have received a contract from the Government to build three steel freight ships.

The Valk & Murdoch Company, Charleston, S. C., has prepared plans for the construction of a 440-foot floating drydock.

The Cape Fear Shipyards Company has been incorporated, with headquarters at Wilmington, N. C., by New York parties.

The Los Angeles Standard Wood Steamship Company has been incorporated, with headquarters in Los Angeles, Cal.

W. A. Boole, Martinez, Cal., has leased 30 acres of waterfront for a shipbuilding site.

It is announced that the Nicholl Terminal Company, Richmond, Cal., will build a shipyard for the construction of both wooden and steel ships.

The Pacific Coast Shipbuilding Company, Oakland, Cal., has been incorporated, with a capital stock of $5,000,000.

Benjamin F. Graham, San Diego, Cal., has secured 6 acres of land, on which he is planning to build a shipyard.

The U. S. Steel Corporation, through Ward B. Purley, vice-president and general manager of the Canadian Steel Corporation, Toronto, Ont., announces that the company will proceed with its projected $20,000,000 development work at Ojibway, Ont. The company is advertising for bids for the construction at Ojibway of a slip and huge concrete and steel docks.

Largest Wooden Passenger and Freight Ship Ever Built in South is Launched

The wooden steamer *Maple*, the largest passenger and freight-carrying ship ever built in the South, was launched with appropriate ceremonies at 4 o'clock on the afternoon of September 15 at the yards of the Slidell Shipbuilding Company, Slidell, La. Miss Sallye Hart Hailey christened the ship.

The *Maple* will be ready for service in about forty-five days. She is 190 feet long, 34 feet beam, with a cargo depth amidships of 11 feet 6 inches and outside depth of 13 feet 4 inches. Her beam over all is 38.8 feet. She has stateroom accommodations for twenty passengers. She will be placed in passenger service between Miami and Jacksonville, Fla., by the Coast Steamship Company, of which Charles L. Dimon, of Mt. Vernon, N. Y., is president.

Southern pine is used almost exclusively in the ship, which is designed for a speed of 10 knots. She will be propelled by an 800-horsepower engine.

The *Maple* was the third wooden steamship to be launched at the Slidell yards. Two other wooden hulls are now on the ways, one of which is expected to be launched in thirty days and the other in four months. The Slidell plant, which will shortly be one of the largest in the South, was for a number of years operated as the Slidell Drydock & Shipbuilding Company, engaged in the work of building barges and small vessels.

Extensive development in the yards already is under way for the building of a number of large composite ships. In order to provide for the new requirements there are now being constructed a fabricating shop for ship steel, brick warehouse, joiner shop, blacksmith shop, machine shop, sheet iron works for the plumbing department, pipe-fitting department and equipment for coppersmiths, electricians and riggers.

Ship Timber Wanted

The Committee on Public Information at Washington announces that wooden shipyards building ships for the Government are in the market for extra large white oak construction timbers or logs of good quality. The ships of the 2,000-ton type now being built for the Government each require two rudder posts of this species, 14 by 24 inches, 40 feet long. Logs measuring 28 inches in diameter at the small end were valued at the end of August at from $50 to $60 per thousand board feet, measured in the log. Sticks, hewed or sawed, on this size, $70 to $80 per thousand board feet, loaded on the cars under 200 miles from the shipyard. These prices apply to the South Atlantic and Gulf yards. Those having such timbers can obtain a list of Eastern shipping firms upon application to the Forest Service, Department of Agriculture.

Standard Oil Craft Navigates Yangtze Rapids

The Standard Oil Company's new steamer, the *Meitan*, arrived July 7 at Chungking, China, from Ichang, with a lighter carrying American kerosene, according to a report from the American Consul. The trip was made in four days, at a period when the rapids of the Yangtze River are very dangerous. It is the first time an American merchant ship has made the journey. This same vessel attempted it some time ago, but rudder trouble developed on the lighter accompanying the steamer, and it was necessary to put back for alterations to Shanghai, where the steamer and lighters were built. The only other merchant vessels at present running between Ichang and Chungking are owned by Chinese and fly the Chinese flag. It is reported that the Asiatic Petroleum Company, a British firm, intends to put a steamer especially designed for the rapids on this run.

Vessel Launched This Year

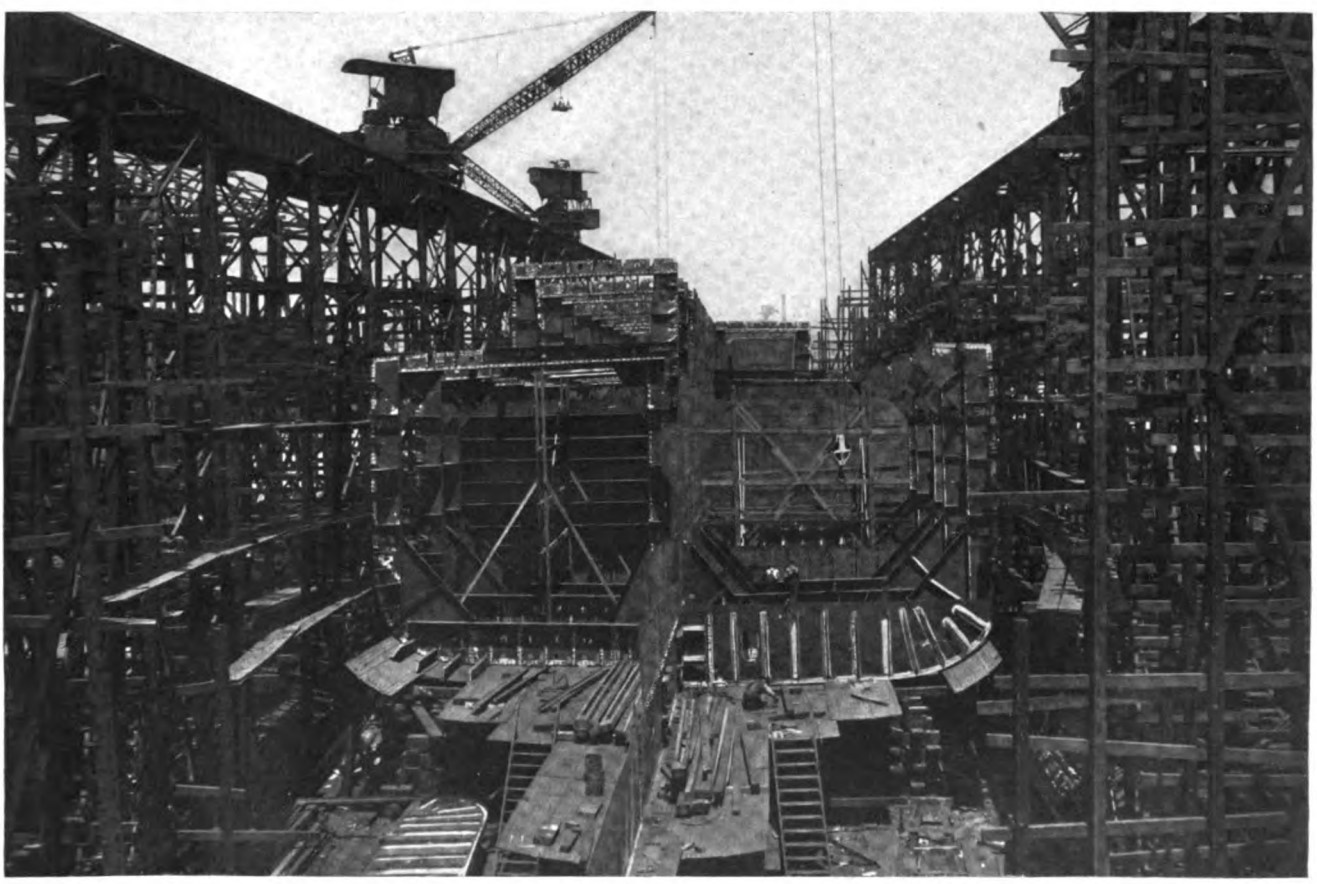
The construction of the *Meitan* was commenced on October 1, 1916, by the Kiangnan Dock & Engineering Works at Shanghai. The vessel was launched on March 19, 1917. It was especially designed to meet conditions in the gorges and rapids of the Upper Yangtze between Ichang and Chungking, which for a long time was believed unnavigable for steamers. This ship can tow two lighters, one on each side, carrying bulk and case oil. It is believed that it can operate eight months of the year.

The steamer's dimensions, etc., are: Length over all, 140 feet 6 inches; length between perpendiculars, 135 feet 6 inches; breadth, 17 feet 6 inches; draft, normal, 5 feet 6 inches; steel construction; speed, 14 knots; machinery, engines, two triple-expansion reciprocating; boilers, two White Forster watertube; auxiliaries, all independent; horsepower, 1,450.

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

(Photograph Copyright by International Film Service, Inc., N. Y.)

Damaged German Ship Being Overhauled and Fitted Out as Transport at American Port



Oil Tanker Construction at Union Iron Works, San Francisco, Cal.

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Application of Law Requiring Inspection by U. S. Officers of Foreign-Built Vessels Admitted to American Registry Suspended by the President for Period of Two Years

The Department of Commerce has made public the following general orders to the Bureau of Navigation, the Steamboat Inspection Service, collectors of customs, local inspectors and others concerned:

"Your attention is called to the following Executive order, by which you will be governed:

EXECUTIVE ORDER

In pursuance of the authority conferred upon the President of the United States by section 2 of the act approved August 1, 1914, entitled "An act to provide for the admission of foreign-built ships to American registry for the foreign trade, and for other purposes," it is hereby ordered:

That the provisions of law requiring survey, inspection and measurement by officers of the United States of foreign-built ships admitted to United States registry under said act are hereby suspended, so far and for such length of time as is herein provided, namely: The said provisions shall not apply to any such foreign-built ship during the period of two years from September 1, 1917, provided the Secretary of Commerce is satisfied in the case of any such ship that the ship is safe and seaworthy and that proper effort is being made to comply with the said provision.

WOODROW WILSON.

The White House,
September 7, 1917.

"Respectfully,
"E. F. SWEET,
"Acting Secretary."

The following explanation of the above is furnished by the Steamboat Inspection Service:

"The Executive order of September 1, 1916, so far as the inspection of foreign-built vessels admitted to American registry is concerned, extended for one year from that date, the period within which such vessels would be required to comply with all of the provisions of the Steamboat Inspection Service, with reference to inspection.

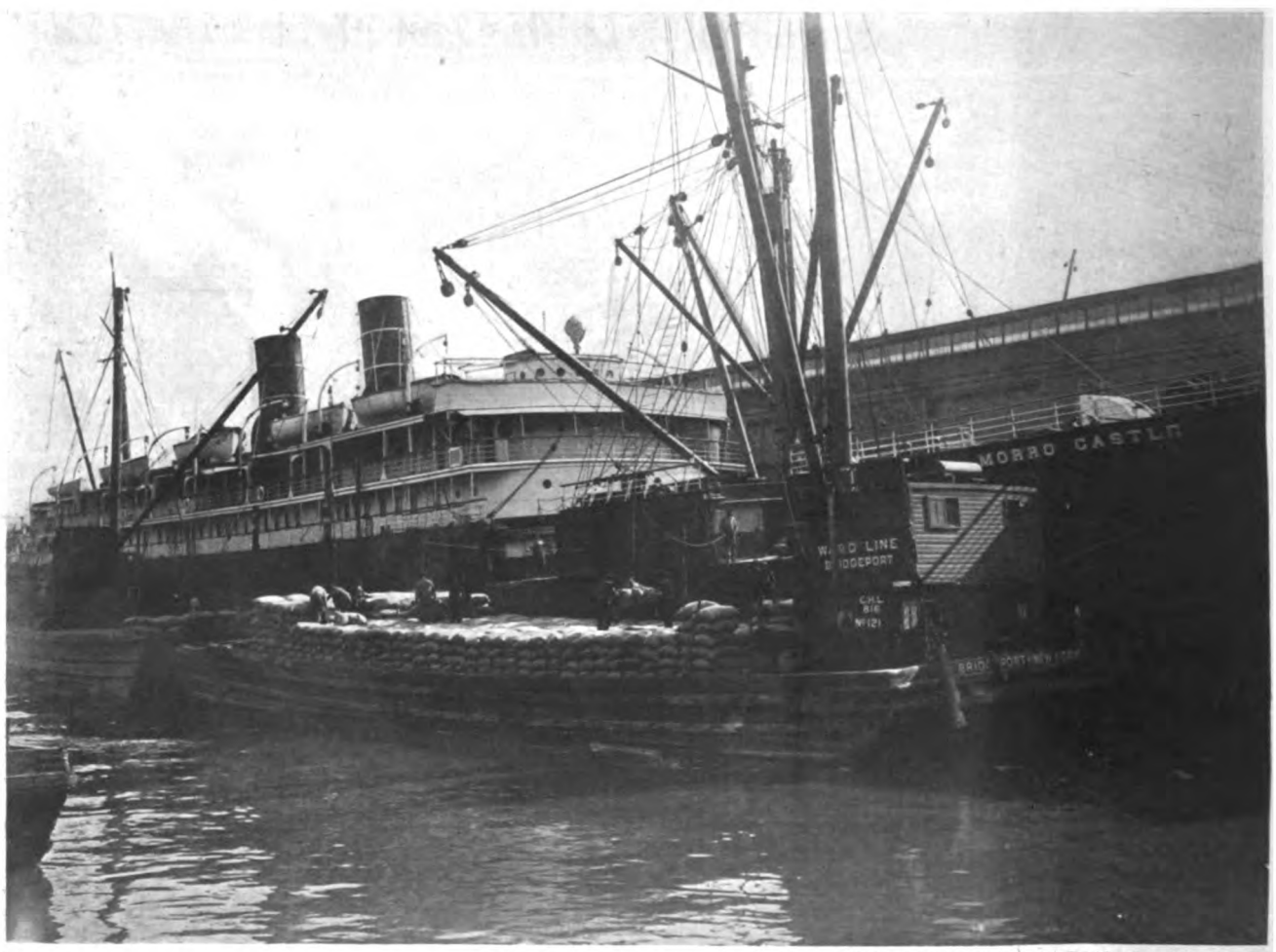
"The Executive order of September 1, 7, 1917, extends for two years from September 1, 1917, the period after which such vessels must comply in all respects with the Steamboat Inspection Service laws, and during such period the provisions of law requiring survey, inspection and measurement by officers of the United States of such vessels are suspended, provided the Secretary of Commerce is satisfied in the case of any such ship that the ship is safe and seaworthy, and that proper effort is being made to comply with the said provisions."

New York and New Jersey Port Development Commissions Organize

The two commissions appointed by Governor Whitman, of New York, and Governor Edge, of New Jersey, to investigate conditions of the port of New York, organized on August 23 by electing William R. Willcox and J. Spencer Smith, chairmen of the two commissions. Gen. George W. Goethals was appointed chief consulting engineer. The commissions will report to the New York and New Jersey Legislatures. On the New York commission are William R. Willcox, E. H. Outerbridge and Arthur Curtiss James, while on the New Jersey commission are J. Spencer Smith, De Witt Van Buskirk and Frank R. Ford. Offices will be established at 115 Broadway.

An attempt will be made to solve the problems presented by the congestion of freight at the port of New York, and to agree upon a joint report, recommending a policy to be pursued by the States of New York and New Jersey and the United States, to the end that the port shall be efficiently and constructively organized and furnished with modern methods of piers, rail and water and freight facilities, and adequately protected in the event of war.

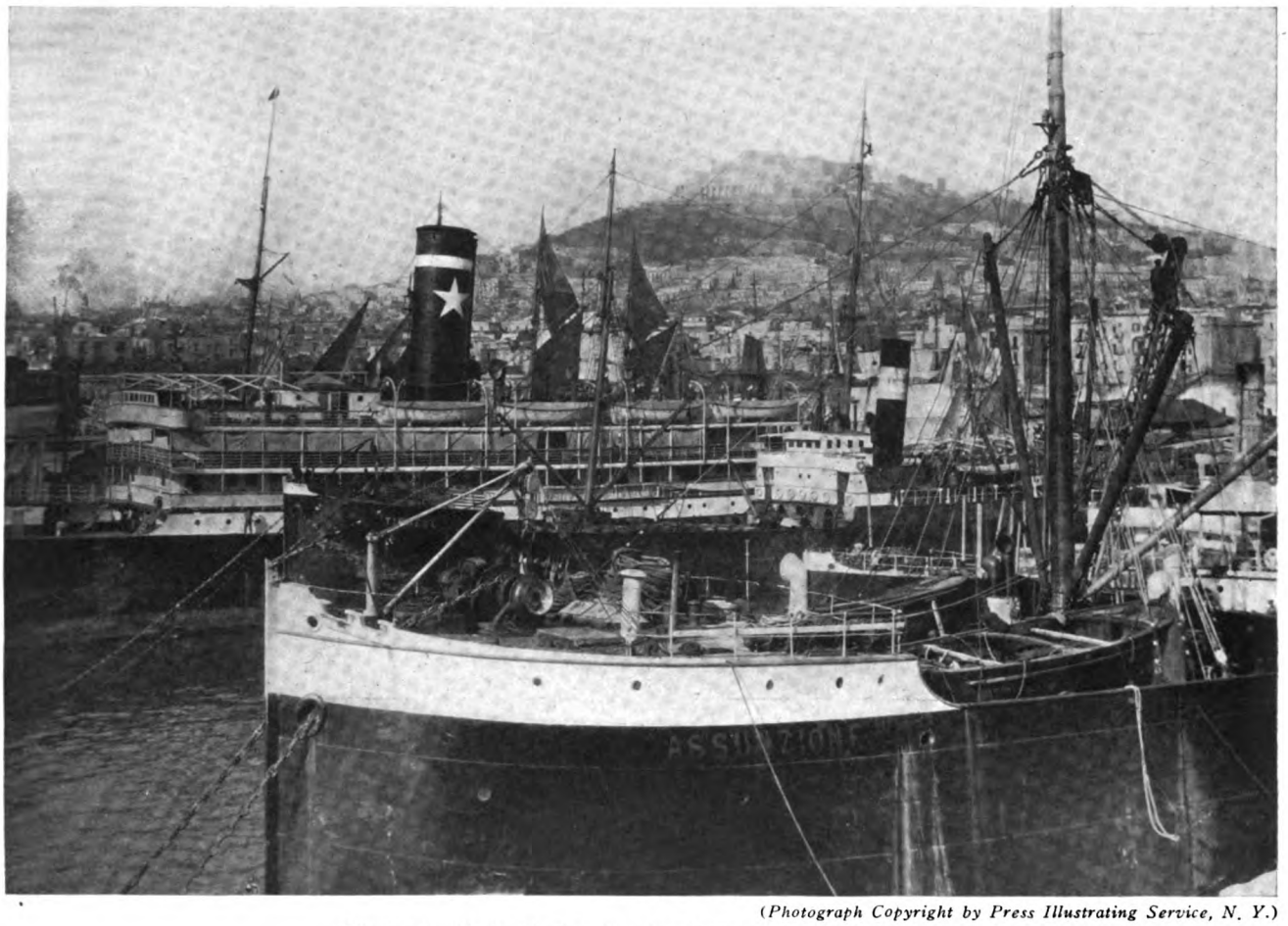
The legislation granting Governor Whitman power to appoint a commission to co-operate with a similar body created under a bill passed by the New



(Photograph Copyright by Edwin Levick, N. Y.)

Shipment of Grain—the Most Vital of all Staples in War or Peace—Being Loaded on Ward Liner

Generated on 2024-08-12 19:33 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN



(Photograph Copyright by Press Illustrating Service, N. Y.)

Shipping in Naples Harbor, Showing Italian Forts in Background

Jersey Legislature, was the result of a special message to the Legislature on March 12, after a conference with Governor Edge of New Jersey and the State Engineer of New York. At this conference it was pointed out that the handling of freight in this port is a national concern, which requires the working out of a comprehensive policy for the intensive use of the port's facilities.

New Shipbuilding Companies Organized

The Redman-Vane Shipbuilding Company has been organized in Baltimore, Md., by J. C. Redman and A. P. Vane.

The Glynn Shipbuilding Company has been organized in Brunswick, Ga., for the purpose of building wooden ships.

The Construction & Dry Dock Corporation has been organized by Walter C. Cabell, Cornelius C. Moore and Walter Curry, Newport, R. I., for the purpose of building a shipyard at Portsmouth, R. I.

Wood & McClure, City Island, N. Y., have opened a ship and yacht repair shop at Mystic, Conn.

The United States Shipbuilding Company, will build a shipyard in Portland, Me., where it has leased a site of 12 acres.

The Wilmington Shipbuilding Company, Investment building, Los Angeles, Cal., will build a shipbuilding plant, and is stated to have received a contract from the Government to build several vessels.

The King & Winge Shipbuilding Company has been organized in West Seattle, Wash., by Thomas J. King and B. & C. B. Winge.

New York Waterways Association Meets

The eighth annual convention of the New York State Waterways Association will be held at Utica, N. Y., on October 4 and 5.

Resolutions will be considered relating to the waterways of the State, including canals and their possible uses by the Federal Government, canal terminals, inland navigable waters, tide waters, river and harbor improvements, the conservation and development of water powers and other matters covered by the declaration of the principles and objects of the association.

Shipyards Active in British Columbia

Shipbuilding in British Columbia has become an important industry. It is reported that contracts for steel and wooden vessels to the value of more than $27,000,000 have been awarded recently.

Among the concerns which are building ships, or which have contracts for them, are: J. Coughlan & Son, Vancouver; the Wallace Shipyards, North Vancouver; the British Pacific Engineering Company, Vancouver; the Taylor Engineering Company, Vancouver; the Whalen Pulp & Paper Company, Vancouver; Cameron, Genoa, Mills, Shipbuilders, Ltd., Victoria; the British Columbia Construction & Engineering Company, Poplar Island, New Westminster; the Pacific Construction Company, Port Coquitlam; Harrison & Lamond, South Vancouver.

Naval Course to Be Given at Yale

Yale University has added to its curriculum this year a course in naval training. The course will prepare students for the position of ensigns in the United States Navy, and will parallel the course in artillery training started last spring to train students for commissions in the artillery branch of the army.

The students will be allowed to take a three-year course to fit themselves for either army or navy commissions.

Ship Sale Nets $2,000,000 Profit

Over two million dollars profit was made on the sale of two of the Merchants & Miners Transportation Company's steamships. The ships are the *Somerset* and *Suwanee*, sold to the Ocean Steamship Company, of Savannah.

The two ships have been in service for over six years, but despite this fact they each sold for an individual profit of $1,010,000 more than they cost to build. This clearly indicates the high price being paid for tonnage.

Generated on 2024-08-12 19:31 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

Ferris Wooden Ship Design May Be Modified

Proposed changes in specifications of timber entering into the construction of the Government's fleet of wooden steamers, which will make possible the cutting of a much larger quantity of such material by Southern mills, may receive the serious consideration of the United States Emergency Fleet Corporation.

The Southern Pine Emergency Bureau has suggested to the Fleet Corporation the advisability of abandoning the present Ferris model of standard 3,000-ton wooden steamers, and the substitution of another which would make it much easier for sawmills to get out timbers that are required for ships, and which would also enable a larger number of mills to cut such timbers. The new specifications suggested call for shorter lengths and smaller sizes.

Boats of a similar capacity to the proposed Government ships are now being built on the Gulf of smaller timbers, and while the Emeregency Bureau was able to secure commitments for more than a sufficient number of mills to cover its blanket order of 100 complete schedules for the Ferris type of ship, the Bureau has stated to the Fleet Corporation that there would be difficulty in securing any considerable number of additional schedules on the original specifications. On the other hand, there would be no trouble in obtaining almost any number required if the specifications were modified as suggested.

Joint Committee Named to Study Concrete Ships and Barges

Robert W. Boyd, consulting engineer, has been retained by the Joint Committee on Concrete Ships and Barges appointed by the American Concrete Institute and the Portland Cement Association. The members of the two committees are as follows:

American Concrete Institute: H. C. Turner, chairman; Leonard C. Wason, Robert W. Lesley, Charles R. Gow, M. M. Upson.

Portland Cement Association: F. D. Boyer, chairman; Joseph Brobston, E. W. Kelly, W. S. Mallory, S. P. Crabo.

An active investigation has been undertaken to determine the possibility of this type of construction.

Canadian Shipyards Operated at Full Capacity

Canada is playing a big part in the shipbuilding industry of the world. No less than 74 steel boats of all kinds were under construction in the Dominion during July and August, these having a gross tonnage of 126,949. Of these, 25 are being built on the Atlantic coast, 30 on the Great Lakes and 19 on the Pacific coast. These do not include the large number of sub-chasers and other boats being regularly shipped to Britain by Canadian shipbuilding concerns.

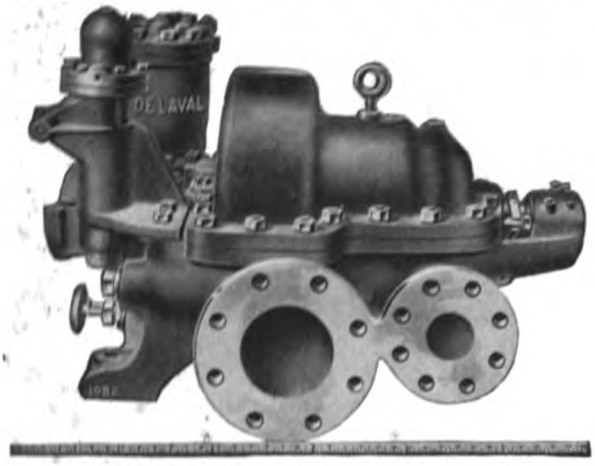


Fig. 1.—3,000 Horsepower, Two-Stage, Centrifugal, Turbine-Driven Boiler Feeder

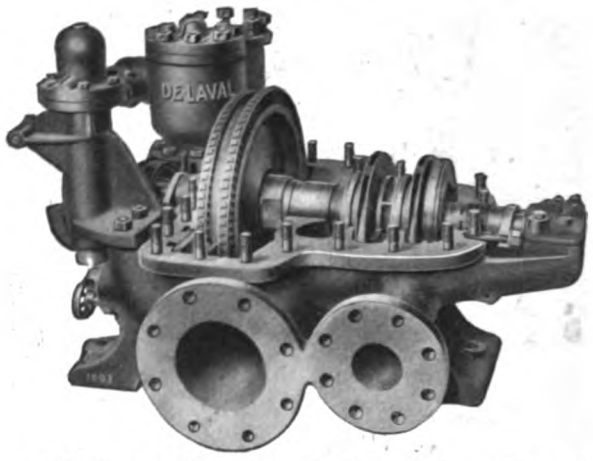


Fig. 2.—Turbine-Driven Boiler Feeder, with Casing Removed, Showing Moving Parts

Mobile to Have Municipal Docks

By an overwhelming majority the citizens of Mobile, Ala., voted on Aug. 13 to authorize the City Commission to arrange a bond issue of $600,000 for the construction of a municipal water terminal. The project as designed comprises concrete wharves, piers and bulkheads, railroad connections to the water front and dredging to a depth of 30 feet. Warehouses are also included in the design, but cannot be built within the present appropriation.

Combined Steam Turbine and Centrifugal Boiler Feed Pump

Since it must handle a comparatively small amount of water against a relatively great head, the centrifugal boiler feed pump should be fitted with small diameter impellers running at high speed. It is therefore well accepted for steam turbine drive.

A development in the direction of compactness and simplicity is shown by Figs. 1 and 2, illustrating a 3,000-horsepower, two-stage centrifugal boiler feeder combined in one casing and one shaft, with a velocity-stage steam turbine. This unit, which has been developed by the De Laval Steam Turbine Company, Trenton, N. J., weighs only about one-tenth as much as a duplex reciprocating pump of the same delivery, and occupies only about one-eighth as much floor space and one-fifteenth as much cubical space.

The pump end contains two single-suction impellers cast from a special bronze and carefully finished to exact contours. Two impellers are used for pressures up to 200 pounds per square inch, and three impellers for higher pressures. Single-stage boiler feed pumps have been built, but two or three stages are preferable, because of the much longer life of the impellers at slower speeds. Each impeller discharges into a volute chamber, by means of which the velocity in the water as it leaves the impeller is converted into pressure before the water is led to the eye of the succeeding impeller. This means of energy conversion is superior to the use of diffusion rings, as it is efficient over a wide range of delivery and, more important still, does not involve the use of small and sharp parts like diffusion blades, which are subject to rapid erosion.

The pump is hydraulically balanced, and only one pair of labyrinth rings, surrounding the suction opening, is required for each impeller except the last, which has two sets of rings. The whole back of the impeller is subjected to a pressure equal to that existing at the periphery of the impeller, the same pressure acting on the front of the impeller, except for the area of the circle enclosed by the labyrinth ring about the suction opening. The last impeller, that is, the one from which the water is finally discharged, is equipped with two sets of wearing rings, one on the suction side and one on the reverse side of the web. As some water from the discharge of this impeller will leak between the wearing rings into the space back of the web, this impeller would be equally as unbalanced as the other impellers in the pump if there were no escape for the leakage water. To provide for diminishing the pressure in this balancing space as much as may be required to bring the whole series of impellers into balance, a leakage outlet is provided from which water can be conducted back to the suction of the first impeller.

The outlet leakage takes place between two collars, one attached to the casing and the other carried on the shaft. When the shaft moves towards the discharge end of the pump this escape is closed off and the pressure builds up in the balancing chamber. If the shaft, on the other hand, moves toward the suction, this escape passage is opened wider, allowing the pressure in the balancing chamber to fall, and at the same time the inleakage between the labyrinth wearing rings is decreased. By this means direct and positive balancing within very close clearance is

Generated on 2024-08-12 19:30 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

secured with the leakage of but a small amount of water.

The reduction of leakage secured by the use of intermeshing labyrinth rings is highly important for securing high efficiency in pumps of comparatively small delivery. With the labyrinth type of rings the leakage path is so tortuous that very little water escapes even at high heads, although ample clearance is provided to take up expansion and contraction due to changes in temperature.

The suction end of the pump is adjacent the turbine, and the shaft packing between the turbine and pump chamber is hence subjected to turbine exhaust pressure on one side and the suction pressure on the other. A simple packing is therefore sufficient, and, in any case, any small leakage of steam in one direction or of water in the other does no harm. As the leakage space adjacent the balancing chamber at the discharge end of the pump is connected back to the pump suction, the packing about the shaft is subjected only to suction pressure. Aside from the intermediate packing already mentioned, there is only one steam packing which is subjected to exhaust pressure.

The steam end of the unit consists of a velocity-stage turbine, with either two or three rows of moving buckets, according to the steam economy desired. The nozzles can be proportioned for either high-pressure steam exhausting to feed heater, or to condenser or for low-pressure steam exhausting to condenser, or the unit can be made interchangeable, thus permitting of a great degree of flexibility in plant design. Where the exhaust steam from the boiler feed pump is consumed in heating feed water, the thermal efficiency of the turbine-driven boiler feed pump is much greater than that of a pump driven by electric motor, or even that of the main unit itself.

The unit is ordinarily fitted with a speed governor mounted upon the end of the shaft, and when running at constant speed the head varies with the delivery. To provide against any possibility of racing, an emergency governor is also fitted. This consists of a pin contained within a hole bored diametrically through the shaft. This pin is held by a spring from flying out under the influence of centrifugal force. When the speed reaches a certain point the spring is compressed so that the pin strikes a trip, releasing another spring, by which the governor valve is closed at once and completely. The normal speeds of these pumps vary from 1,800 to 3,500 revolutions per minute, according to pressure and capacity, and due to the heavy shafts employed are far below the critical speeds.

In specifying the capacity of boiler feeders, the temperature of the water to be pumped should always be stated, as the capacity is nearly 50 percent greater with water at 75 degrees F. than with water at 210 degrees F. For the same reason capacity and efficiency tests of a pump should be carried out with water at the temperature at which it will be received by the pump when in actual service.

Automatic Starters for Induction Motors

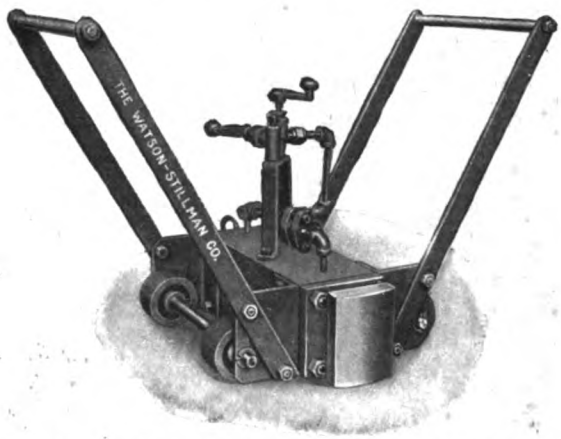
In order to aid manufacturers in their efforts to increase production and reduce operating expenses, the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa., is manufacturing automatic starters and controllers for motor-driven machinery. These automatic starters are for use with single-phase or polyphase squirrel cage and wound-rotor induction motors, where it is desired to start the motor from a remote point, or where automatic acceleration is required to guard against improper starting by unskilled operators. They are simple, reliable and rugged in construction, consisting of a magnetic contactor panel and a master switch, which may be either a push button, a float switch, a pressure regulator, or similar device for closing the control circuit, depending upon the service. The vital element is the magnetic contactor. The contactors used on these starters are of a type which has been used by the Westinghouse Company with marked success in steel mill, cement plant and mine installations where the requirements are extremely severe. The contactors are opened by strong spring action assisted by gravity. The destructive action of the arc is reduced to a minimum by strong blowout coils and arcing horns. The operation of the starters is very simple.

The advantages resulting from the use of automatic starters for induction motors comprise absolute protection to both operator and expensive machinery, proper starting at the most rapid permissible rate, economy in operation and maintenance, convenience of remote control, and automatic operation.

Portable Bending Machine for Steel Shapes

The Watson-Stillman Company, New York, has brought out a new tool for use in shipbuilding, designed to bend heavy steel shapes for ship frames, deck beams, etc. It is a very compact machine, built as light as consistent with the work it is intended to do. The machine consists of a cylinder, ram and operating valve, mounted upon broad rollers so that it may be moved quickly over the bending slabs by handles at either side of the machine. It is thus possible to bend long members to template without reheating and with a minimum of labor.

A loose pin is provided which fits into the holes in the bending slabs, and serves as an abutment for the machine. The ram is double acting, and its movement both forward and returning is under perfect control at all times. Provision is made to prevent overstroke. The illustration shows the machine equipped with a screw stem stop and release valve, but a single lever operating valve can be furnished if desired. Power may be supplied from a suitable pump, or preferably from an accumulator service. The machine is built as shown with a movement at right angles to the axis of the ram, or in a direction parallel to it.



Portable Machine for Bending Bars and Shapes

The machine illustrated has a 10-inch stroke and develops 18 tons at 1,500 pounds per square inch, and 20 tons at 1,750 pounds per square inch pressure. It weighs 750 pounds.

Personal

Henry J. Roundy, formerly assistant marine superintendent of the Lake Torpedo Boat Company, Bridgeport, Conn., has been appointed chief construction inspector for the United States Shipping Board Emergency Fleet Corporation, Southern District, with headquarters at Houston, Texas.

H. E. Hilts, formerly district engineer at San Francisco for the Portland Cement Association, has been elected by the Board of Directors of that body to succeed the late Mr. J. P. Beck as general manager.

Obituary

George W. King, president of the Marion Steam Shovel Company, Marion, Ohio, died on September 9, aged sixty-three. Mr. King had been connected with the company since its formation in 1884 and had been its president since 1904.

John H. Morrison, of Brooklyn, N. Y., died recently at his summer home in Ocean Grove, N. J., aged seventy-six. By profession Mr. Morrison was a naval architect, but is best known to the marine world as an historian. He was the author of "History of American Steam Navigation," first published in 1903, and which is one of the most complete and reliable compilations of American steam navigation available. Mr. Morrison was also a frequent contributor to this journal, his latest contribution, published only a few months ago, being on the subject of the development of oil tankers in America.

Generated on 2024-08-12 19:56 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN

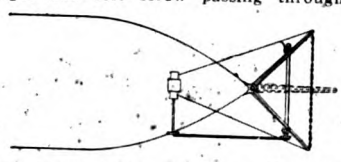
SELECTED MARINE PATENTS

The publication in this column of a patent specification does not necessarily imply editorial commendation.

American patents, compiled by Delbert H. Decker, Esq., registered patent attorney, Millerton, N. Y.

1,223,416. SHIP BRAKE. THOMAS O'SULLIVAN, OF MONTREAL, QUEBEC, CANADA.

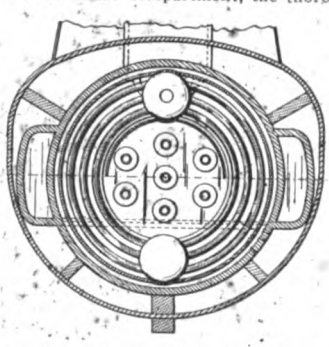
Claim 1.—Ship brake, comprising a pair of plates hingeably secured to the stem of a ship, a right and left screw passing through the



plates, and nuts operating on said screw pivotally mounted on the plates, and means for rotating the screw. Three claims.

1,224,105. WATERTUBE BOILER FOR SUBMARINES. GREGORY C. DAVISON, OF NEW LONDON, CONN., ASSIGNOR TO ELECTRIC BOAT COMPANY, A CORPORATION OF NEW JERSEY.

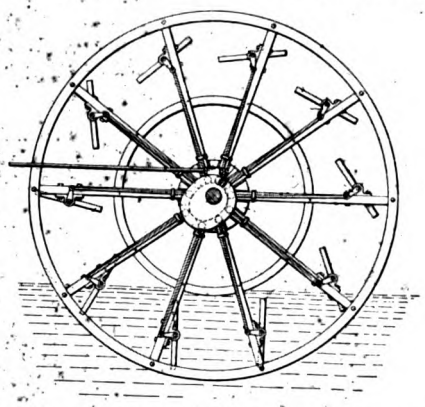
Claim 1.—In a submarine boat, in combination, an inner hull, an outer hull, a closed compartment within the inner hull, a watertube boiler located in said compartment and a fore-and-aft arranged thoroughfare compartment alongside the boiler compartment, the thorough-



fare compartment extending forward and aft beyond the forward and aft ends of the boiler compartment, and openings in the inner hull forward and aft of the boiler compartment for affording direct communication to the thoroughfare compartment. Fourteen claims.

1,225,287. FEATHERING PADDLE-WHEEL. OSCAR E. THOMPSON, OF HADLOCK, WASH.

Claim 1.—A paddle-wheel, comprising in its construction spokes, paddles provided with pintles, whereby the paddles are pivotally connected to the spokes, a crank on each of said



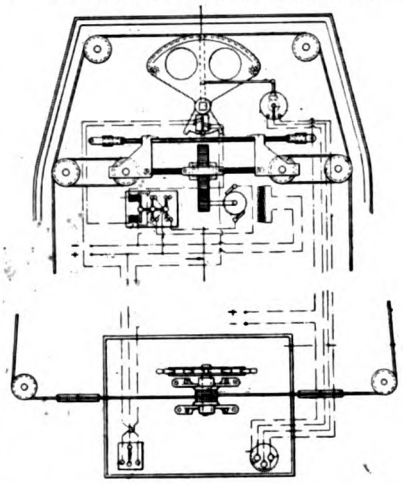
pintles, a cam formed with a web member and two spaced flanges extending laterally therefrom, said web member being provided with an opening between said flanges, a series of rollers operable against the opposing surfaces of said flanges and adapted to be introduced or removed through said openings, rods connecting said rollers with the respective cranks, and means provided on the spokes and serving to direct the rods whereby the rollers are caused to revolve with the wheel to effect the tilting movements of the various paddles through the agency of said cam flanges. Two claims.

1,202,519. APPARATUS FOR SECURING LINES TO SUNKEN VESSELS. DAVID W. HIVELY, OF SEATTLE, WASH., ASSIGNOR OF ONE-HALF TO ENOS B. CADE, OF SEATTLE, WASH.

Claim 6.—A device comprising, in combination, means operable from the surface for bolting a plate having a line attached, to the hull of a submerged vessel, means for propelling the device, means for directing the device toward a vessel, and magnets for securing the device to the vessel while said plate is being bolted in position. Twenty-six claims.

1,225,913. RUDDER CONTROL. FRANK W. WOOD, OF MONTCLAIR, N. J., ASSIGNOR TO CHARLES CORY & SON, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

Claim 1.—The combination with the rudder of a vessel, a manually operable steering element, and tiller connections extending between the rudder and said element for producing rudder movements, of power mechanism in perma-

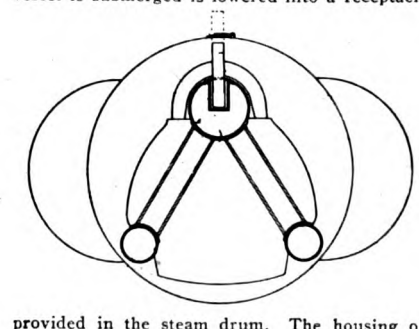


nent operative engagement with said connections intermediate the rudder and steering element and adapted to produce rudder movements when the mechanism is active and when said element is held stationary, the length of the connections between rudder and steering element remaining constant during mechanism operation. Six claims.

British patents compiled by G. F. Redfern & Co., chartered patent agents and engineers, 15 South street, Finsbury, E. C., and 10 Gray's Inn place, W. C., London.

104,318/16. "IMPROVEMENTS RELATING TO FUNNELS OF SUBMARINE VESSELS." H. E. YARROW, OF MESSRS. YARROW & CO., LTD., OF SCOTSTOUN, GLASGOW, SCOTLAND, ENGINEER.

The funnel is made telescopic, and when the vessel is submerged is lowered into a receptacle



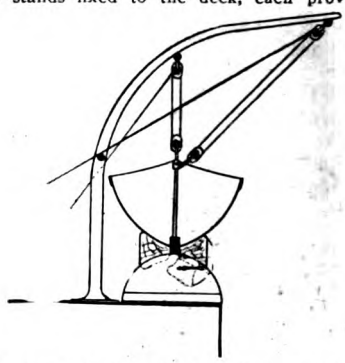
provided in the steam drum. The housing of the funnel in the steam drum also provides a firm foundation for the base of the funnel to rest upon when it is in the housed position, and has to be made water-tight.

104,610/16. "AN IMPROVED EMERGENCY PATCH OR BREACH COVER FOR USE ON SHIPS." W. MATHEWS, OF MAES-Y-LLAN, TONNA, NEATH, SOUTH WALES, BLACKSMITH.

The emergency patch or breach cover consists of a plate of aluminum covered upon one side with sailcloth and carrying strips of aluminium for additional strength, one such strip being across, at or near the top, another one at or near the bottom, and another such strip or strips across the middle or otherwise between the top and bottom, also a number of steel ropes attached in pairs perpendicularly upon the plate, each pair fastened to a pulley on the top and a ring on the bottom, and finally a bridle on the plate for enabling it to be drawn from place to place by a winding rope.

102,213/16. "METHOD OF LAUNCHING BOATS FROM SHIPS AT SEA." E. T. JACKSON, OF 9, WILSON STREET, MIDDLESBROUGH, IN THE COUNTY OF YORK, MASTER MARINER.

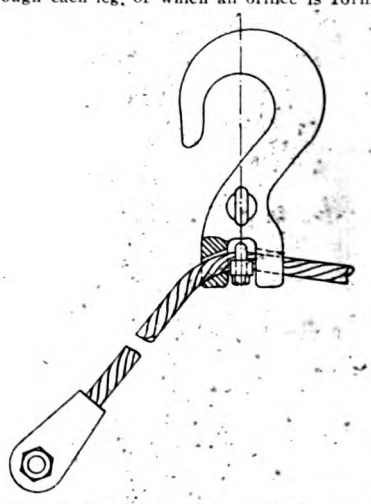
This method and means for supporting and lowering boats consists of two semi-circular boat stands fixed to the deck, each provided



with a fixed chock and a hinged chock held in position by lever actuated pin in combination with two lengthened fixed davits supporting inner and outer tackles.

104,814. "IMPROVED MEANS OF SLINGING NESTED BOATS." P. D. MURRAY, OF WINDYMERE, MOOR LANE, GREAT CROSBY, IN THE COUNTY OF LANCASTER, MASTER MARINER AND MARINE SURVEYOR.

This invention relates to improved means of slinging nested lifeboats and to the provision of a special design of slings and hooks for same. Each sling is arranged longitudinally of the nested boats and is carried by or secured in the specially designed hook or eye, which is provided with an inverted U-termination through each leg, of which an orifice is formed



to receive said sling; within the recess so formed is arranged a locking clamp consisting of a staple shaped clip passing over the sling, whose free ends are threaded and bolted through a block having grooves therein for engaging the strands of wire rope; compression is thus applied by the nuts so securing the hook or eye in any desired position on the sling. Small eyes are provided on each side of the hook to receive the guy chains, which pass laterally to the longitudinal stringers on each side of the boat.

106,534. "IMPROVED BREACH MAT FOR CLOSING LEAKS IN SHIPS AND BOATS." A. R. M. SANKEY, OF POLYGON HOUSE, SOUTHAMPTON, IN THE COUNTY OF HANTS, AND A. J. SMITH, OF "EDGEHILL," PEAK HILL, SYDENHAM, IN THE COUNTY OF LONDON.

This invention relates to breach mats for closing leaks in ships and boats and of the type which is constructed of elastic waterproof material reinforced by linked metallic slats, sufficient flexibility being secured in order that the mat may be free to conform to the profile of the hull. The objects of the invention are speed in the application of the mat to the side of the ship, improved means whereby the mat is adapted to conform to the curvature of the hull, and ease in manipulation.

Generated on 2024-08-12 19:53 GMT / https://hdl.handle.net/2027/mdp.39015080010682
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF MICHIGAN